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MUSEUM OF NATURAL HISTORY

Free-Living Copepoda From Ifaluk Atoll in the Caroline Islands With Notes on Related Species

WILLEM VERVOORT

Rijksmuseum van Natuurlijke Historie
Leiden, Netherlands

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Frank A. Taylor
Director, United States National Museum

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Free-Living Copepoda
From Ifaluk Atoll in the Caroline Islands
With Notes on Related Species

Free-Living Copepoda
From Ifaluk Atoll in the Caroline Islands
With Notes on Related Species

Introduction

A SMALL COLLECTION of nonparasitic Copepoda—collected during a survey of the fauna of Ifaluk Atoll, Caroline Islands, and obtained as a result of the Coral Atoll Project of the Pacific Science Board—was placed at my disposal at the end of 1959. This collection, containing Calanoida, Cyclopoida, and Harpacticoida—some 250 individuals in all—proved to contain a fair number of sand-dwelling species. Largely as a result of our very scanty knowledge of Pacific Harpacticoida in general and sand-dwelling forms in particular, the study of this highly interesting collection took much more time than I originally expected, but I thought it worthwhile to report the collection as completely as possible and particularly to illustrate the new forms as well as I could. Though the total number of species present is not very impressive, the percentage of new forms among them is high. Many of the previously described forms, moreover, are here recorded for the first time from the Pacific area.

For the taxonomy of the Harpacticoida, which comprises the bulk of the present material, I have proceeded completely on the basis of Lang's monograph (1948). One cannot avoid the fact that, in the course of the revision of certain families and genera, differences of opinion arise: in several instances I have been forced to express viewpoints very much at variance with those published by Lang. This does not alter the permanent value of his monumental work, which has greatly facilitated the identification of harpacticoids and which presents a wealth of additional information. For the synonymy of the species discussed here I refer to Lang's monograph; only those papers that are not included in his bibliography or that have appeared since have been cited in the present work. The list of references at the end of this report makes no claim to completeness; only those studies that have been cited are included.

In the nomenclature of structural particulars of Harpacticoida I have followed the terminology adopted by Lang; I have abandoned abbreviations as much as possible and composed the descriptions in such a way that comparison is facilitated. All drawings have been made with a camera lucida and show a certain formalization: unimportant details have been omitted in order not to obscure the essential points. This applies particularly to the setae, the plumosity of which usually has not been represented.

All the material, including type specimens and slides, has been deposited in the U.S. National Museum of the Smithsonian Institution. Before each dissection the animal was stained in a weakly alkaline solution of Chlorazol Azurine or Chlorazol Black E (Edward Gurr, London). The dissected parts were mounted in "Berleze."

In the enumeration of the species of the various genera, a trivial name in parentheses (usually only one of the sexes) indicates that this particular stage has been mentioned but not actually described. The use of parentheses in the lists of measurements indicates the average in a series of length measurements.

I want to express my sincere gratitude to Dr. Fenner A. Chace, Jr., Curator, Division of Marine Invertebrates, U.S. National Museum, who originally suggested that I should study the Ifaluk copepods and who, in various ways, has stimulated this work. Financial support from the Pacific Science Board (National Academy of Sciences-National Research Council), for which I would like to convey my thanks to the authorities concerned, greatly facilitated this study. Gratitude is also due to Dr. H. Boschma, Dr. L. D. Brongersma, and Dr. L. B. Holthuis, all of the Rijksmuseum van Natuurlijke Historie, Leiden. Finally, I am indebted to Miss M. L. A. van Welij for her care in preparing the typescript.

Collecting Localities

81–A–3–d. Sept. 28, 1953. Washed from beds of alga *Lyngbya*, lagoon shelf, sandy bottom, near patch of reef about 100 ft. from lagoon shore. Lagoon shelf W. of SW. end of Falarik Islet. Depth about 6 ft. Coll. D. P. Abbott.

Ifanella chacei, new species
Eudactylopus fasciatus Sewell
Metamphiascopsis hirsutus (Thompson and Scott)

167–D–7. Oct. 25, 1953. Washed from *Halimeda*. From bottom of ship passage between Falalap and Ella islets, near the W. tip of Falielang (the reef extending W. from the W. shore of Falalap Islet). Depth 13–14 ft. Coll. Yaniseiman, Bakalimar, and R. Harry.

Peltidium intermedium A. Scott

194–E–5. Oct. 10, 1953. Plankton haul, surface water of open lagoon, taken at 2100–2300 hours. Coll. D. P. Abbott.

Centropages orsinii Giesbrecht
Acartia tonsa Dana
Oithona oculata Farran

425. Sept. 30, 1953. Edge of reef outside of élang,* south of Elangalap, 3 to 4 ft. of water at low tide, washed from plants.

Harpacticus clausi A. Scott
Harpacticus confusus, new species
Dactylopodia tisboides (Claus)
Idomene purpurocincta (Norman and T. Scott)
Amphiascopsis cinctus (Claus)

431. Oct. 1, 1953. From *Caulerpa* from reef ridge end of Falarik, transect C.

Ectinosoma dentatum Steuer
Halophytophilus fusiformis (Brian)
Scutellidium dentipes, new species
Scutellidium ligusticum (Brian)
Porcellidium malleatum, new species
Dactylopodia tisboides (Claus)
Eudactylopus andrewi andrewi Sewell
Idomene purpurocincta (Norman and T. Scott)
Amphiascopsis cinctus (Claus)
Ameira minuta Boeck
Orthopsyllus pectinicauda, new species
Laophonte cornuta Philippi

588. Oct. 16, 1953. From sand sample for Foraminifera, transect B, seaward reef about middle of Falarik. From second 20 ft. interval in from reef margin. In the outer flat.

Ectinosoma dentatum Steuer
Scutellidium ligusticum (Brian)
Peltidium exiguum A. Scott
Laophonte cornuta Philippi

589. Oct. 16, 1953. From sand sample as in 588, but from third 20 ft. interval in from reef margin.

Cyclopina brachystylis G. O. Sars
Euryte pseudorobusta, new species
Ectinosoma dentatum Steuer
Perissocope bayeri, new species
Scutellidium ligusticum (Brian)
Parastenhelia spinosa (Fischer)
Amphiascus minutus (Claus)
Amphiascopsis cinctus (Claus)
Amphiascoides subdebilis (Willey)
Ameira minuta Boeck
Nitocra affinis Gurney
Laophonte cornuta Philippi
Laophonte ifalukensis, new species
Onychocamptus armiger (Gurney)

590. Oct. 16, 1953. From sand sample as in 588, but from fourth 20 ft. interval in from reef margin.

Euryte pseudorobusta, new species
Ectinosoma dentatum Steuer
Scutellidium ligusticum (Brian)
Diarthrodes nobilis (Baird)
Dactylopusia tisboides (Claus)
Parastenhelia spinosa (Fischer)
Amphiascus minutus (Claus)
Amphiascus hirtus Gurney
Amphiascopsis cinctus (Claus)
Ameira longipes Boeck
Nitocra affinis Gurney
Orthopsyllus pectinicauda, new species
Laophonte cornuta Philippi
Esola longicauda Edwards
Onychocamptus armiger (Gurney)

591. Oct. 16, 1953. From sand sample as in 588, but from sixth 20 ft. interval in from reef margin.

Euryte pseudorobusta, new species
Ectinosoma dentatum Steuer
Scutellidium ligusticum (Brian)
Amphiascus minutus (Claus)
Ameira parvula (Claus)
Nitocra affinis Gurney
Laophonte ifalukensis, new species

---

*". . . a word in the Ifaluk language which refers to a reef area covered with large, wave tossed coral boulders" (F. M. Bayer, in litt.).

592. Oct. 16, 1953. From sand sample as in 588, but from 17th 20 ft. interval in from reef margin, taken from sand pockets between boulders of the élang.

Acartia tonsa Claus
Cyclopina steueri Früchtl
Ectinosoma dentatum Steuer
Dactylopodella incerta, new species
Parastenhelia spinosa (Fischer)
Amphiascopsis cinctus (Claus)
Metamphiascopsis hirsutus (Thompson and A. Scott)
Robertgurneya spinulosa (G. O. Sars)
Robertgurneya rostrata (Gurney)
Amphiascoides subdebilis (Willey)
Parialysus robustus (Nicholls)
Metis holothuriae (Edwards)
Nitocra affinis Gurney
Leptomesochra pygmaea, new species
Phyllopodopsyllus longicaudatus A. Scott
Orthopsyllus pectinicauda, new species
Lourinia armata (Claus)
Laophonte ifalukensis, new species
Laophonte ifalukensis var. *brevipes,* new variety
Paralaophonte spinicauda, new species
Esola longicauda Edwards
Esola longicauda var.

594. Oct. 7, 1953. From sponges from coral rock, Ifaluk Lagoon near the passage, collected by Tawaita.

Amphiascus minutus (Claus)
Ameira longipes Boeck
Orthopsyllus dubius, new species
Microlaophonte spongicola, new species
Pseudocletopsyllus spiniger, new species

638. Oct. 17, 1953. From crevices in porolithon heads just inside *Heterocentrotus* zone on transect B, seaward reef margin, middle of Falarik.

Halophytophilus fusiformis (Brian)
Scutellidium ligusticum (Brian)
Peltidium purpureum Philippi
Dactylopodia tisboides (Claus)
Parastenhelia spinosa (Fischer)
Amphiascus minutus (Claus)
Ameira longipes Boeck
Ameira minuta Boeck
Laophonte cornuta Philippi
Laophonte ifalukensis, new species
Paralaophonte pilosoma, new species
Onychocamptus gladiator, new species
Pholenota spatulifera, new species

709. Oct. 23, 1953. From sponges on reef, Helipore zone S. of Elangalap.

Pseudocyclops pacificus, new species
Laophonte dinocerata Monard, 1926

756. Oct. 28, 1953. From hydroids from ship passage, 5–5.5 fath. Coll. Yaniseiman.

Macrocheiron cheliferum (Thompson and A. Scott)

800. Oct. 31, 1953. From beneath boulders on élang on seaward reef at S. end of Falarik.

Amphiascoides subdebilis (Willey)
Phyllopodopsyllus longicaudatus A. Scott

Harry Sta. 41. Oct. 3, 1953. Reef in center of lagoon off Paugob Canoe House, Falarik Islet, depth 35–40 ft., among alga *Microdictyon.*

Bomolochus leptoscari Yamaguti
Halophytophilus fusiformis (Brian)
Peltidium purpureum Philippi
Amphiascopsis cinctus (Claus)
Nannomesochra arupinensis (Brian)

Order Calanoida

Family Centropagidae Giesbrecht, 1892

Genus *Centropages* Krøyer, 1849

Centropages orsinii Giesbrecht, 1889

FIGURE 1*a*

Centropages orsinii Giesbrecht, 1889, p. 811; 1892, pp. 305, 316, 321, pl. 17 (figs. 35, 36, 41, 42), pl. 18 (figs. 2, 14, 23), pl. 38 (figs. 12, 19); 1896, pp. 317, 318, 319.—Giesbrecht and Schmeil, 1898, p. 57.—Cleve, 1900b, p. 1026; 1901, p. 5.—A. Scott, 1902, pp. 404, 423.—Thompson and Scott, 1903, p. 247.—Cleve, 1904, p. 359.—Wolfenden, 1905, p. 1015, pl. 98 (figs. 1, 4, 5, 8, 11, 12).—A. Scott, 1909, p. 115.—Sewell, 1912, pp. 315, 362.—Brady, 1915, p. 135.—Früchtl, 1923, p. 450; 1924, p. 44.—Rose, 1924a, p. 485.—Menon, 1931, p. 509.—Sewell, 1932, p. 230.—Dakin and Colefax, 1933, p. 205.—Farran, 1936, p. 109.—Mori, 1937, p. 60, pl. 29 (figs. 1–7).—Dakin and Colefax, 1940, p. 91, figs. 110a–c.—Mori, 1942, pp. 553, 569.—Tokioka, 1942, p. 181.—Sewell, 1947, p. 163.—C. B. Wilson, 1950, p. 187.—Krishnaswamy, 1953, p. 122.—Tanaka, 1953, p. 133.—Rose, 1955, p. 391.—Chiba, 1956, p. 41.—Rose, 1956, p. 460.

MATERIAL.—Loc. 194–E–5, 1 ad. ♂, 1.11 mm.

REMARKS.—One male specimen of this form occurred in a surface haul made in the open lagoon. *Centropages orsinii* is a species which is distributed widely in the tropical parts of the Indian and Pacific oceans: Durban Bay, Union of South Africa (Brady, 1915); the Gulf of Aden (A. Scott, 1902; Cleve, 1904); the Red Sea (Giesbrecht, 1889, 1892; Cleve, 1900b, 1904); the Arabian Sea, including the Maldive and Laccadive Islands (Cleve, 1900b, 1904; Wolfenden, 1905; Sewell, 1912); the Persian Gulf (Pesta, 1913); the Bay of Bengal, including the Gulf of Mannar and the Ceylon pearl oyster banks, and Madras (Thompson and A. Scott, 1903; Sewell, 1912, 1932; Menon, 1931; Krishnaswamy, 1953); the Malay Archipelago (Cleve, 1901; A. Scott, 1909; Früchtl, 1924); the Great Barrier Reef of Australia (Farran, 1936); the coastal waters of New South Wales, Australia (Dakin and Colefax, 1933, 1940); the Fiji Islands (C. B. Wilson, 1950); the Palau Islands, Marshall Islands (Mori, 1942; C. B. Wilson, 1950); and the coastal waters of Japan (Tanaka, 1953). Farran's specimens from the Great Barrier Reef are of particular importance; the females measured 1.20–1.56 mm., the males 1.20–1.38 mm. There appeared to be a considerable variability in length in both sexes. The species occurred both inside and outside the reef. The Ifaluk specimen is slightly smaller than the minimal length given by Farran, but its occurrence fits well into the normal area of distribution.

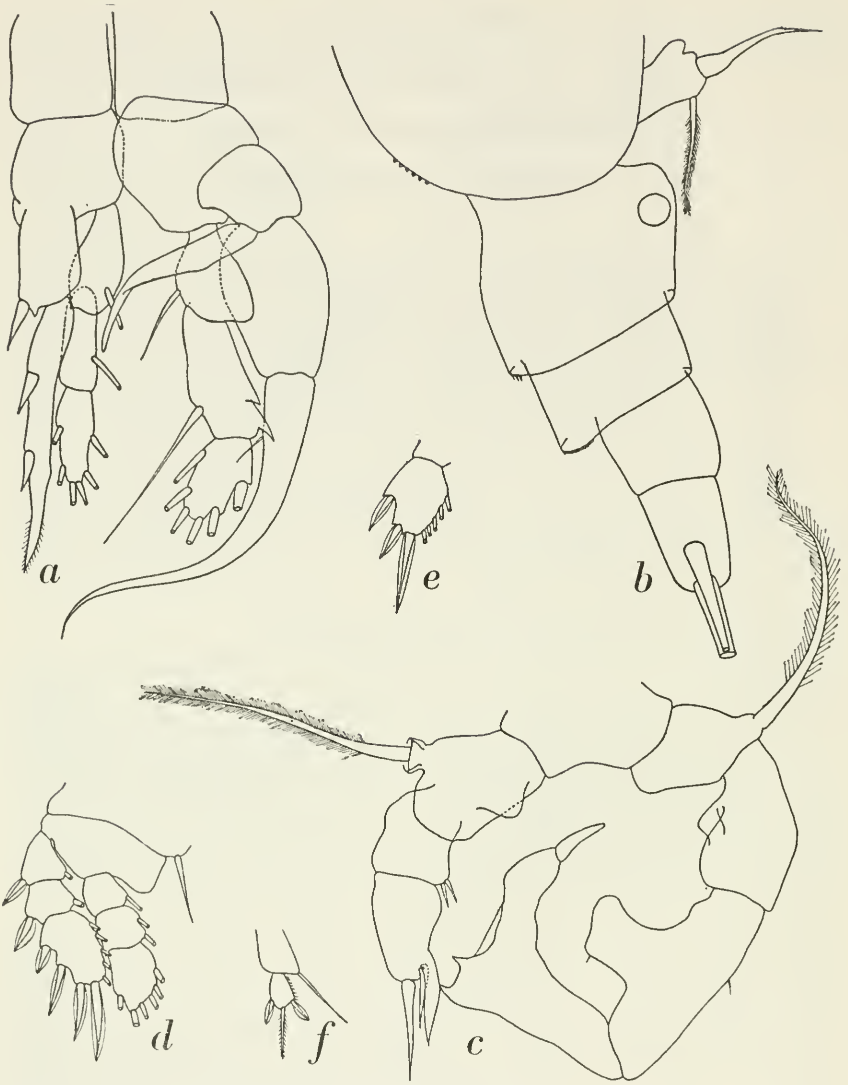


Figure 1.—*Centropages orsinii* Giesbrecht, loc. 194–E–5, ad. ♂: *a*, 5th legs. *Acartia tonsa* Dana, loc. 194–E–5, ad. ♀: *b*, leg 5 and abdomen, lateral view from right side; loc. 592, ad. ♂: *c*, 5th legs. *Cyclopina steueri* Früchtl, loc. 592, ad. ♀: *d*, leg 3; *e*, 3rd segment exopodite leg 4; *f*, leg 5. (*a*, *b*, × 275; *c*–*f*, × 460.)

Family Pseudocyclopidae Giesbrecht, 1893

In its present form the family Pseudocylopidae comprises only the genus *Pseudocyclops* Brady, 1872. The genera *Ridgewayia* Thompson and A. Scott, 1903, *Lampoidopus* Esterly, 1911, and *Suezia* Gurney, 1927, all of which show a certain relationship with *Pseudocyclops*, have been united by M. S. Wilson (1958, p. 140) in the genus *Ridgewayia* and placed in the separate family Ridgewayiidae.

The generic characters of *Pseudocyclops* can be summarized as follows:

Females.—Body short and compactly built; cephalothorax in dorsal aspect ovoid, in lateral aspect with broadly rounded, almost tumified head. Head and 1st thoracic somite usually separate, fused in some species, produced anteriorly into downwardly directed, strong, 1-pointed rostrum. Thoracic somites 4 and 5 separate or fused; 5th somite usually small; it may be produced into rounded lappet. Abdomen composed of 4 somites; genital somite, resulting from fusion of somites 1 and 2, with widely separated genital apertures. Anal somite notably small, almost fused with furcal rami, usually telescoped into 4th abdominal somite.

Antennule short, scarcely reaching end of head or slightly longer, 18-segmented; segmentation may be further reduced to 17 by almost complete fusion of first two free segments, or to 14 by fusion of more segments. Antennules strongly setose, part of the setae may be plumose; aethetascs on basal and apical segments.

Antenna with 3- or 4-segmented exopodite; segment 1 and apical segment big; latter at right angle with rest of exopodite. Apical part of 2nd segment of 2-segmented endopodite may be split off as separate segment.

Mandible with distinct line of fusion between coxa and basis; this part of appendage lengthened. Exopodite 3- to 4-segmented, distinct; endopodite 2-segmented.

Maxillule with distinct praecoxal arthrite; endites of coxa and basis small, almost hidden between arthrite and greatly produced 4th segment. Endopodite well developed, unsegmented; exopodite present, bearing at least 8 setae. Coxal epipodite present, bearing several setae; basal exite absent.

Maxilla short, compact, with 2 praecoxal endites, 2 coxal endites and slightly bigger basal endite. Endopodite small, 2-segmented, bearing some setae.

Maxillipede also short and compact; coxa with 3 lobes, basis short, with terminal endite; endopodite likewise short, 4-segmented.

Legs 1–4 with 3-segmented endopodites and exopodites. At first glance the setation and spinulation of the various species, as recorded in the literature, appears to be slightly variable, but if we account for a tendency of reduction of the external marginal spines of the 3rd exopodal segment of leg 1, a displacement of the terminal external marginal spine to the apex in the 3rd exopodal segment of legs 1–4, and a displacement of the apical internal seta, accompanying the apical spine of the 3rd exopodal segment of legs 1–4 to the internal margin, we come to uniform setal formulae for all species. Leg 5 differently developed in the various members of the genus; exopodite always 3-segmented, endopodite 1- to 3-segmented. Setal formula:

	endopodite	*exopodite*
leg 1	1.2.321	1.1.322
leg 2	1.2.422	1.1.422
leg 3	1.2.422	1.1.423
leg 4	1.2.322	1.1.423
leg 5	(modified)	0–1.1.0–413

MALES.—Only slightly differing from females in general form of body. Rostrum more slender, at times movable at base. Abdomen 5-segmented; genital aperture at left side of 1st abdominal somite; anal somite as small as in female and nearly fused to furcal rami. Left antennule as in female, number of aesthetascs on basal segment increased. Right antennule modified to form grasping antennule, movable part formed by 3 or 4 segments. Oral parts not reduced. Legs 1–4 as in female. Leg 5 strongly modified, chelate; coxae large, swollen, both sides sometimes fused. Left basis fused to coxa, right basis free. Exopodites strongly deformed; endopodites present as blade-shaped appendages, that of right side usually fused with basis.

Type species: *Pseudocyclops crassiremis* Brady, 1872.

The following species of *Pseudocyclops* are known:

FEMALES	MALES
P. crassiremis Brady, 1872	*P. crassiremis* Brady, 1872
P. obtusatus Brady and Robertson, 1873	*P. obtusatus* Brady and Robertson, 1873
P. umbricatus Giesbrecht, 1893	*P. umbricatus* Giesbrecht, 1893
P. magnus Esterly, 1911	
P. latens Gurney, 1927	
	P. latisetosus Sewell, 1932
P. simplex Sewell, 1932	*P. simplex* Sewell, 1932
P. australis Nicholls, 1944	
P. reductus Nicholls, 1944a	
P. gohari Noodt, 1958	*P. gohari* Noodt, 1958
P. cokeri Bowman and González, 1961	*P. cokeri* Bowman and González, 1961
P. paulus Bowman and González, 1961	*P. paulus* Bowman and González, 1961
P. rostratus Bowman and González, 1961	*P. rostratus* Bowman and González, 1961
P. rubrocinctus Bowman and González, 1961	*P. rubrocinctus* Bowman and González, 1961

A new species will be described below as:

P. pacificus, new species

The various species can be distinguished best by peculiarities of the 5th legs. The following keys, which may serve to distinguish the females and males known at present, are based largely on such characters.

Key to the Species of *Pseudocyclops*

FEMALES

1. Number of setae along internal margin of 3rd exopodal segment of leg 5 reduced, the total armature of this segment being composed of 3 spines at external margin, 1 spine at apex (at times pressed aside and inserting along internal margin), and 0–3 setae along internal margin 2
   4 setae along internal margin of 3rd exopodal segment of leg 5; in addition there are 3 spines along external margin of that segment and 1 spine at apex. (Compare *P. crassiremis*, in which the internal setae are very small.) 5
2. 3 fine, short setae along internal margin of 3rd exopodal segment of leg 5, in addition to above-mentioned spines. Very small species (♀ 0.40–0.42 mm.), setae 2 and 3 of furca thickened at base. **P. paulus** Bowman and González
   0–1 seta along internal margin of 3rd exopodal segment of leg 5, in addition to above-mentioned spines 3
3. No seta at internal margin of 3rd exopodal segment of leg 5; of 3 external marginal spines, the distal inserts almost apically, the apical spine inserts internally. Endopodite of leg 5 2-segmented; segment 1 with strong internal seta, segment 2 subpyriform, with several small, spiniform setae and a transversal row of teeth . . . **P. cokeri** Bowman and González
   A single seta at internal margin of 3rd exopodal segment of leg 5, in addition to the (displaced) apical spine and 3 external marginal spines 4
4. Endopodite of leg 5 unsegmented, pyriform, with single strong, internal seta and 3 transversal rows of teeth. Rostrum very strongly developed . . . . **P. rostratus** Bowman and González
   Endopodite of leg 5, 3-segmented; segments 1 and 2 with strong spiniform prolongation of external margin and internal seta, segment 3 with 1 external, 2 apical, and 1 internal seta, in addition to 2 rows of teeth . . . . **P. reductus** Nicholls
5. 1st segment of endopodite of leg 5 with seta at internal margin; endopodite of leg 5 either distinctly 3-segmented or 2nd and 3rd endopodal segments fused 6
   1st segment of endopodite of leg 5 without internal seta; endopodite of leg 5 composed of 1 or 2 free segments, but 1st and 2nd segments always more or less fused 11
6. 2nd and 3rd endopodal segments of leg 5 fused; total number of setae on 5th endopodite 4: 1 (internal) on 1st, 1 (internal) on 2nd, and 2 (apical) on 3rd segment . . . . **P. umbricatus** Giesbrecht
   2nd and 3rd endopodal segments of leg 5 separate; total of setae on endopodite of leg 5 numbers 5–8 7
7. 3rd endopodal segment of leg 5 with 6 setae: 2 at internal, 2 at external margin and 2 at apex 8
   3rd endopodal segment of leg 5 with 4 or fewer setae 9
8. Cephalon and 1st thoracic somite separate, antennules 18-segmented. **P. rubrocinctus** Bowman and González
   Cephalon and 1st thoracic somite fused, antennules 17-segmented. **P. simplex** Sewell

9. Setae at 3rd endopodal segment of leg 5 strongly reduced: there are 2 almost fully reduced setae at internal margin and 1 at apex. Several rows of spinules on 2nd and 3rd segments. No spinuous process at external margin of 1st endopodal segment of leg 5 and no club-shaped appendage on 2nd exopodal segment of leg 1 . . . **P. obtusatus** Brady and Robertson
 3rd endopodal segment of leg 5 with 4 setae: 2 at internal margin, 2 at apex 10
10. 4th abdominal somite with a pair of big spines at dorsal part of distal border, covering 5th abdominal somite. No spinuous process at external margin of 1st endopodal segment of leg 5; 2nd exopodal segment of leg 1 without club-shaped process beneath spine at external margin . . **P. gohari** Noodt
 4th abdominal somite with smooth border. There is a strong spinuous process at external margin of 1st endopodal segment of leg 5; 2nd exopodal segment of leg 1 with club-shaped process beneath spine at external margin **P. australis** Nicholls
11. All segments of endopodite of leg 5 fused, forming a curiously shaped endopodite with 2 external spines (representing external spines of segments 1 and 2), 2 apical spines flanking a small seta, and 2 almost apical internal spines. About 5 rows of teeth on endopodite . . **P. crassiremis** Brady
 1st and 2nd endopodal segments of leg 5 fused, segment 3 free. Fused 1st-2nd segments on each side produced into a spine; segment 3 with strong apical spine and 1 seta 12
12. Large species (♀ 1.1 mm.), thoracic somites 4 and 5 separate. **P. magnus** Esterly
 Small species (♀ 0.63 mm.), thoracic somites 4 and 5 fused. Rami of furca internally produced, overlapping . . . . **P. latens** Gurney

MALES

1. Left endopodite of leg 5 with 4–5 setae with swollen, nude base and plumose, slender apical part 2
 Left endopodite of leg 5 with some small setae or teeth 6
2. Abdominal somites or anal operculum armed with big, strong teeth . . . 3
 Abdominal somites with smooth distal borders or with fine teeth; anal operculum unarmed 4
3. Abdominal somites 2 to 4 distally armed with big, strong spines, particularly well developed on 4th somite. Furcal setae 2 and 3 on each side strongly swollen, sausage-shaped, strongly plumose. **P. gohari** Noodt
 Abdominal somites unarmed, but anal operculum with strong, flat spines. Setae 2 and 3 of furca thick, with strong, basal marginal spines. **P. pacificus,** new species
4. Head and 1st thoracic somite fused; left endopodite of leg 5 with 4 setae. **P. cokeri** Bowman and González
 Head and 1st thoracic somite separate; left endopodite of leg 5 with 5 setae 5
5. Very small species (♂ 0.37–0.43 mm.); right antennule 14-segmented. Setae of left endopodite placed along distal margin; spine at external margin of left 1st exopodal segment linear, without serrate lamella. **P. paulus** Bowman and González
 Bigger species (♂ 0.50 mm.); right antennule 17-segmented. Setae of left endopodite with the following distribution: 1 internal, 3 apical, and 1

external. Spine at external margin of left 1st exopodal segment strong, with broad, serrate, lamellar edge. **P. rubrocinctus** Bowman and González

6. Spine at external margin of left 1st exopodal segment strongly reduced. Segments 9–13 of clasping antennule greatly swollen and short, with spinuous process on 13th segment . . . . **P. simplex** Sewell

External marginal spine of left 1st exopodal segment of leg 5 normally developed, i.e., with lancet-shaped, finely serrated, marginal lamella, large and strong. Segments 9–13 of clasping antennule moderately swollen, of normal length, no spinuous process on the 13th segment . . 7

7. Setae 2 and 3 of furca strongly developed, especially the basal parts greatly swollen, also with marginal spinules . . . . . . **P. latisetosus** Sewell

Setae of furca normally developed, not thickened, barbed or plumose. . . 8

8. Head and 1st thoracic somite, as well as 4 and 5, separate. 5th thoracic somite at apex narrowly rounded. . **P. obtusatus** Brady and Robertson

Head and 1st thoracic somite fused 9

9. Thoracic somites 4 and 5 fused, lateral thoracic margin broadly rounded. Rostrum normally developed . . . . **P. crassiremis** Brady

Thoracic somites 4 and 5 separate, lateral thoracic margin narrowly rounded. Rostrum very big, strongly developed. Epimeral plates of 2nd thoracic somite backwardly produced into pointed process. **P. rostratus** Bowman and González

Genus *Pseudocyclops* Brady, 1871

Pseudocyclops crassiremis Brady, 1872

Pseudocyclops crassiremis Brady, 1872, p. 7, pl. 2 (figs. 1–8); 1872a, p. 431, pl. 17 (figs. 1–8); 1878, p. 82, pl. 7 (figs. 1, 2), pl. 12 (fig. 14).—T. Scott, 1894a, p. 237.—Giesbrecht and Schmeil, 1898, p. 126.—van Breemen, 1908, p. 144, fig. 163.—Sars, 1919, p. 14, pls. 8, 9.—Rose, 1924, p. 481.—Pesta, 1927, p. 37.—Rose, 1933, p. 248, fig. 313.—Nicholls, 1944, pp. 10, 11.—Noodt, 1958a, p. 156.

Pseudocyclops crassicornis T. Scott, 1894, p. 233.

Bottom dweller, usually found at depths of 20–30 fms. It was actually recorded from Seaham Harbour on the Durham coast of England (1 male, 0.65 mm. length; Brady, 1872); off St. Monance on the Firth of Forth of Scotland (rather scarce, no sex given: T. Scott, 1894a); and from Korshavn on the Norwegian Skagerrak Coast (some males and females, ♀ 0.86 mm., ♂ 0.80 mm. length; Sars, 1919). The species thus appears to be narrowly confined to the North Atlantic.

Pseudocyclops obtusatus Brady and Robertson, 1873

Pseudocyclops obtusatus Brady, 1872, p. 8 (nomen nudum).

Pseudocyclops obtusatus Brady and Robertson, 1873, p. 128, pl. 8 (figs. 4–7).—Brady, 1878, p. 84, pl. 12 (figs. 1–13).—T. Scott, 1894a, p. 233; Giesbrecht and Schmeil, 1898, p. 126.—Brady, 1902, p. 55.—Sars, 1902, p. 131, pl. 88.—T. Scott, 1902, p. 454; 1903, p. 112, pl. 6 (figs. 13–15).—Thompson and A. Scott, 1903, p. 250.—Norman and T. Scott, 1906, p. 131.—Pearson, 1906, p. 29.—van Breemen, 1908, p. 144, fig. 162.—Sars, 1919, p. 14.—Rose, 1924,

p. 482.—Sars, 1925, p. 346.—Pesta, 1927, p. 37.—Marine Biological Association, 1931, p. 157.—Rose, 1933, p. 247, fig. 312.—C. B. Wilson, 1936, p. 370.—Nicholls, 1944, pp. 10, 11.—Herbst, 1953, p. 266.—Marine Biological Association, 1957, p. 160.—Noodt, 1958a, p. 156.

Found on soft, muddy bottoms and on laminarians; occasionally, especially during the night, in surface plankton. Though always in small numbers, the species has been recorded from the west coast of Ireland in Roundstone Bay and Bantry Bay (Brady and Robertson, 1873); the Plymouth region of England (Norman and T. Scott, 1906); various localities in Scottish waters: the Firth of Clyde (Brady, 1878), the Firth of Forth (Brady, 1878; T. Scott, 1894a), and Moray Firth (T. Scott, 1903). Moreover, it occurs along the north coast of Norway near Kristiansund (Sars, 1902) and in northern Canadian waters in the Bay of God's Mercy on Southampton Island (C. B. Wilson, 1936). Additional records are from the Azores area in the Atlantic (Sars, 1925), from Banyuls-sur-Mer, France, on the Mediterranean (Rose, 1924, 1933; Herbst, 1953), from the Indian Ocean south of Socotra Island (Thompson and A. Scott, 1903), and in pearl oyster washings from the Ceylon pearl oyster banks (Thompson and A. Scott, 1903). The females measure about 0.8 mm.; the males, 0.7 mm. The distribution of this form, as evident in the records given above, is wide, but because of its bottom-dwelling habit, it easily escapes detection.

Pseudocyclops umbricatus Giesbrecht, 1893

Pseudocyclops umbricatus Giesbrecht, 1893, p. 64, pl. 5 (figs. 16–31).—Giesbrecht and Schmeil, 1898, p. 125.—Gurney, 1927, p. 455.—Brian, 1928, pp. 35–37.—Nicholls, 1944, pp. 10, 11.—Gohar, 1954, p. 58.—Noodt, 1958a, p. 156.—Bowman and González, 1961, p. 49.

Found on sandy and muddy bottom in the Bay of Naples, Italy (Giesbrecht, 1893; Brian, 1928); near Port Said, Egypt (Gurney, 1927); and in Lake Timsah on the Suez Canal (Gurney, 1927). It has been found from a depth of some decimeters down to 120 m. depth. The females measure 0.60–0.65 mm.; the males, 0.54 mm. Both Giesbrecht and Gurney seem to have studied a fair number of specimens; Brian studied 3 females.

Pseudocyclops magnus Esterly, 1911

Pseudocyclops magnus Esterly, 1911, p. 223, pl. 1 (figs. 6, 8), pl. 3 (fig. 23), pl. 4 (fig. 41).—Nicholls, 1944, p. 10.—Noodt, 1958a, p. 156.—M. S. Wilson, 1958, p. 178.

In spite of Nicholls' arguments in favor of the synonymy of this form with *Pseudocyclops latens* Gurney, I have left both forms separate. There is a considerable discrepancy in size, whereas in *P. magnus* the 4th and 5th thoracic somites are separate. Esterly's description is exceedingly vague. *P. magnus* occurred in one specimen, a female, 1.1 mm. length, from a pelagic haul at Agar's Island in Bermuda; it has never been captured since.

Pseudocyclops latens Gurney, 1927

Pseudocyclops latens Gurney, 1927, p. 455, fig. 108.—Nicholls, 1944, p. 10.—Noodt, 1958a, p. 156.—M. S. Wilson, 1958, p. 178.

One specimen, a female, 0.63 mm. length, is known; it occurred in a night haul at Ismailia on Lake Timsah of the Suez Canal. Unfortunately, Gurney could not describe the structure of the antennules and the mouth parts; only legs 3 and 5 are figured.

Pseudocyclops latisetosus Sewell, 1932

Pseudocyclops obtusatus var. *latisetosus* Sewell, 1932, p. 330, figs. 108a-f

Pseudocyclops latisetosus was described originally on the basis of a single male specimen, 0.78 mm. length, from the Indian Ocean; the exact locality is not given in Sewell's paper. It was introduced originally as a variety of *P. obtusatus*, with which undoubtedly it is closely related, but in the structure of the 5th legs there are sufficient differences to raise it to specific level. It is differentiated, moreover, by a very peculiar structure of the furcal setae.

Pseudocyclops simplex Sewell, 1932

Pseudocyclops simplex Sewell, 1932, p. 332, figs. 109a–l.—Nicholls, 1944, pp. 10, 11; 1944a, p. 489.—Noodt, 1958, p. 156.

This species was described by Sewell on the basis of material from the Indian Ocean; the exact locality and the number of specimens is not given in his paper. There is a considerable discrepancy in size between the female (0.5 mm.) and the male (0.72 mm.). Sewell's drawing of the 5th legs of the male (fig. 109l) is very vague and probably not fully correct.

Pseudocyclops australis Nicholls, 1944

Pseudocyclops australis Nicholls, 1944, pp. 11, 12, fig. 4; 1944a, p. 488.—Noodt, 1958, p. 156.

Only two specimens of this form are known, the adult female (0.78 mm. length) and a juvenile form; the adult female is the only stage described. Nicholls' description, though rather short, contains all points of importance and gives the setal formula of all legs; all essential appendages are figured. The species occurred at Sellick Reef in South Australia. No further details are given.

Pseudocyclops reductus Nicholls, 1944

Pseudocyclops reductus Nicholls, 1944a, p. 488, fig. 1.—Noodt, 1958a, p. 156.—Bowman and González, 1961, p. 58.

This species is described rather cursorily in Nicholls' paper and only the antennule, antenna, 5th legs, and abdomen are figured. Setal formulae for all legs fortunately are given; the species is said to approach *P. australis* very closely. 8 female specimens, varying in length from 0.50 to 0.60 mm., were found at Hurghada on the Red Sea.

Pseudocyclops gohari Noodt, 1958

Pseudocyclops gohari Noodt, 1958a, p. 151, figs. 1–14.

This very distinct and curious species was described recently by Noodt on the basis of many adult male and female specimens from Hurghada on the Red Sea, where it was found in small pockets of sand between sand-incrusting algae of the littoral zone. ♀ 0.95 mm.; ♂ 1.0 mm.

Pseudocyclops cokeri Bowman and González, 1961

Pseudocyclops cokeri Bowman and González, 1961, p. 41, figs. 1–3.

A large number of females and males of this species were obtained in Magüeyes Channel between Magüeyes Island and an area near La Parguera, Puerto Rico. It was found living in great numbers between algae attached to the leaves of turtle grass, *Thalassia testudinum*. ♀ 0.5–0.6 mm.; ♂ 0.45–0.55 mm.

Pseudocyclops paulus Bowman and González, 1961

Pseudocyclops paulus Bowman and González, 1961, p. 46, figs. 4, 5.

Found in smaller numbers at the same locality and under comparable conditions as *P. cokeri*. This is an exceedingly small species. ♀ 0.40–0.42 mm.; ♂ 0.37–0.43 mm.

Pseudocyclops rostratus Bowman and González, 1961

Pseudocyclops rostratus Bowman and González, 1961, p. 49, figs. 6–8, 9g.

Some specimens of this curious form were found between *P. cokeri*, *P. paulus*, and *P. rubrocinctus* at the same locality as these species. It is particularly characterized by the strongly developed rostrum. ♀ 0.72–0.76 mm.; ♂ 0.72 mm.

Pseudocyclops rubrocinctus Bowman and González, 1961

Pseudocyclops rubrocinctus Bowman and González, 1961, p. 54, figs. 9a–f, 10, 11.

Collected together with *P. cokeri* and *P. paulus* at the same locality; it probably lives under the same conditions as these species. In its living state it is brightly colored. ♀ 0.55–0.62 mm.; ♂ 0.50 mm.

***Pseudocyclops pacificus*, new species**

Figures 2–4

Material.—Loc. 709, 1 ad. ♂, 0.69 mm.

Description.—The following is based on the specimen mentioned above (holotype), which has been dissected and mounted on slides.

Adult male, total length 0.69 mm. Proportional length of cephalothorax and abdomen 32:15.

Small species with compactly built cephalothorax and comparatively long abdomen with long, strongly developed setae (figs. 2*a*,*b*). Head and 1st thoracic somite fused to form cephalic somite; no line of fusion visible. Thoracic somites 4 and 5 separate. Cephalothorax ovate in dorsal aspect. In lateral aspect cephalic somite anteriorly broadly rounded, almost tumid, frontal part of head flat and running into slender, one-pointed rostrum (fig. 2*e*). Line of back smoothly curved. Distinctly pigmented spot between insertion of antennules indicates well-developed eye, visible in preserved specimen in dorsal and lateral aspects. 5th thoracic somite small, though better developed than in *P. obtusatus*, well separated from 4th, visible as a narrow band in dorsal view; lateral margins of 5th somite rounded, covering about half the genital somite.

Abdomen 5-segmented; 1st (genital) somite nearly symmetrical, genital aperture on left side. 1st to 4th abdominal somites of nearly equal length, slightly telescoped in present specimen (figs. 2*c*,*d*). The various somites and the furca have the following proportional lengths:

somite	1	2	3	4	5	furca	
	15	24	24	19	7	11	=100.

Anal somite small, anal operculum armed with 4 spines, visible in lateral and dorsal aspect. In lateral aspect largest spines reach beyond middle of furca. In dorsal aspect structure of spines can best be observed; 2 small median spines flanked by much larger spine on left and right sides (figs. 2*c*,*d*).

Furcal rami about as long as broad. Four spiniform setae on each ramus and small, external, setiform spine. Seta 1 slender, about as long as abdomen, haired. Seta 2 long and strong, about twice as long as abdomen, haired, basal part nude, armed with 3 strong spines on external and 2 strong spinules on internal margin. Seta 3 slightly shorter than 2nd seta, at base of external border, with strong tooth; basal part of internal margin set with spiniform hairs gradually increasing in size distally. Remainder of seta haired. Seta 4 almost as 1st, shorter, also haired. External setiform spine nude (figs. 2*c*,*d*).

Antennules short, not quite reaching end of cephalic somite. They are 18-segmented; antennule on left side normally developed, on right side formed as clasping antennule. Segments of left antennule notably thick, with the exception of ultimate and penultimate segments, which are slender. Setation of antennule represented in figure 3*a*; setation of segments 2–14 uniform, composed of two setae, one small, one large. 1st segment much larger than following segments, with 3 sets of each 2 setae. In addition, there are 2 aesthetascs. Segment 15 with 1 seta at external border; segment 16 with large seta at external border and a smaller seta at internal border. Segment 17 with internal and external apical seta; ultimate (18th) segment with internal and external marginal seta and 5 apical setae, one of which has a swollen base and resembles an aesthetasc. Proportional lengths of the antennular segments:

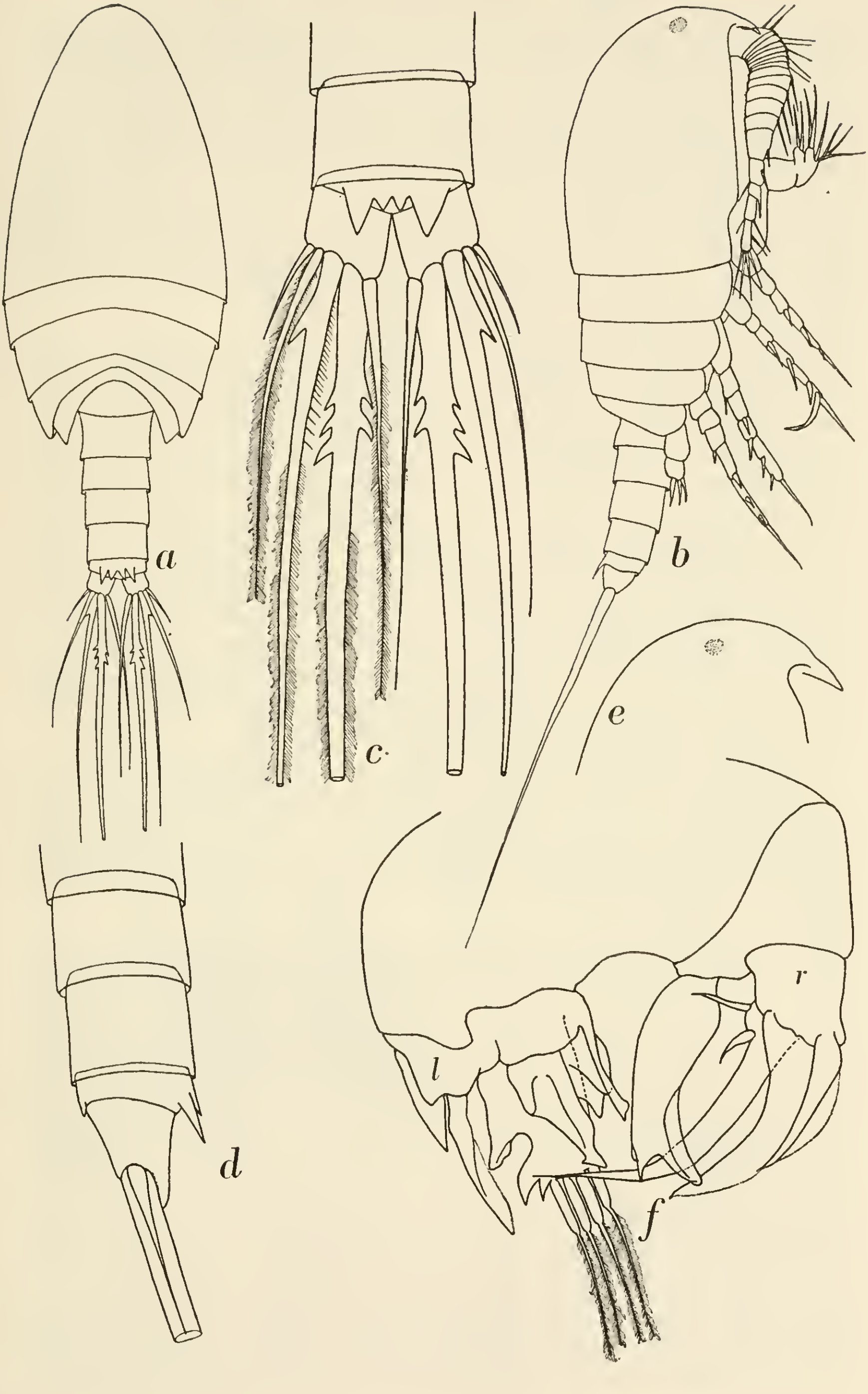
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18
140	30	30	30	20	30	30	30	40	40	40	50	60	40	60	80	130	120=1,000.

Right antennule shaped as clasping organ, hinge developed between 14th and 15th segments (fig. 3*b*). My preparation proved to be unsatisfactory for studying the setation of this appendage. Spines on 15th and 16th segments: that on 15th small and externally directed, that on 16th stronger and internally directed. Setae of antennules nude.

Preparation of antennae unsuccessful; exopodites of both sides became detached during preparation (fig. 3*c*). Coxa small, without seta, almost fused with much larger, elongate basis, with single seta at apex of internal margin. 1st endopodal segment elongate, with one internal seta at ⅓ of border from apex. 2nd endopodal segment very elongate; apical part, apparently representing external lobe and carrying 6 marginal setae and 1 appendicular seta, articulating with rest of segment. That part of 2nd endopodal segment with 4 marginal and 3 terminal setae.

Cutting edge of mandibular praecoxa in unfavorable position in my preparation, with the result that it could not be studied. Coxa small, basis much larger, elongate, with single seta at internal margin. Endopodite 2-segmented, 1st segment small, with 3 subapical setae; apical (2nd) segment large, with 8 marginal setae and 1 appendicular seta. Exopodite small, apparently 4-segmented, basal 3 segments each with remarkably strong, densely plumose seta; apical (4th) segment with 3 smaller, plumose setae (fig. 3*d*).

FIGURE 2.—*Pseudocyclops pacificus*, new species, loc. 709, ad. ♂, holotype: *a*, whole animal, dorsal view; *b*, same animal, lateral view from right side; *c*, distal part abdomen and furca, dorsal view; *d*, idem, lateral view from left side; *e*, head, lateral view from right side, antennules removed; *f*, 5th legs. (a, *b*, × 100; *c*, d, × 275; *e*, × 145; *f*, × 460.)


a
b
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e
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Praecoxa of maxillule with well-developed arthrite, carrying 9 strongly developed, spiniform setae, some of which are spinulose. Endites of coxa and basis well developed but almost concealed by arthrite, basal endite largest, each with 3 setae. 4th segment with 4 plumose setae at internal margin. Coxal exite (epipodite) small, with 4 long setae. Basal exite well developed, with 1 seta. Exopodite well developed, inserting at base of 4th segment, reaching half its length. There are 10 marginal setae. Endopodite set at right angle with 4th segment, apparently 3-segmented, but segmentation, even in stained preparation, almost invisible. The segments have 3, 3, and 5 setae respectively (fig. 3*e*).

Maxilla with well-developed praecoxa, distinctly separate from coxa. There are 2 praecoxal endites, proximal with 4, distal with 3 strongly plumose setae. Coxa with 2 slightly lengthened endites, with each 3 plumose setae. Basipodite not divided, with 1 thick endite, carrying 2 strong, curved, spiniform setae and a much smaller seta. Endopodite distinct, 2-segmented, with 2 and 3 setae respectively (fig. 3*f*).

Coxa of maxillipede with 4 lobules or endites, with 0, 0, 3, and 1 setae respectively. Setae on proximal lobes may have been removed by dissection, as well as one of the setae on the distal lobe, leaving only the strong, spinulose seta. Basis well developed, triangular by development of strong, apical internal lobe, carrying 3 setae. Endopodite 4-segmented, with 2, 2, 2, and 3 setae respectively. In addition, there is an external seta on segment 2 (fig. 4*f*).

Endopodites and exopodites of legs 1 to 4, 3-segmented. All setae on the legs have the following structures: Basal part strongly developed, tubiform. At about half the length of a seta there is a sudden constriction; the remainder of the seta is fine. The whole seta is plumose. The spines usually have a broad, serrated lamina, spear-shaped in outline.

Leg 1 (fig. 4*a*) with internal seta at coxa, basis with blunt internal spine. 1st segment of endopodite with 1 internal, 2nd with 2 internal, and 3rd with 3 internal setae. 1st segment of endopodite without spine at external margin; 2nd with external margin terminating in a short spine; 3rd segment with external seta, 1 short apical spine and 2 apical setae on internal side of that spine. 1st segment of exopodite with 1 internal, 2nd with 1 internal, and 3rd with 3 internal setae. External margin of 1st and 2nd exopodal segments distally with spear-shaped spine; 2nd segment, in addition, with small proximal and larger distal spinule at base of this large spine. External margin of 3rd exopodal segment with 2 spines at external margin, preceded by a small spine, with the result that, at first glance, 3 external marginal spines appear to be present. Apex of 3rd exopodal segment with long terminal spine, 1½ times length of segment, with serrated ex-

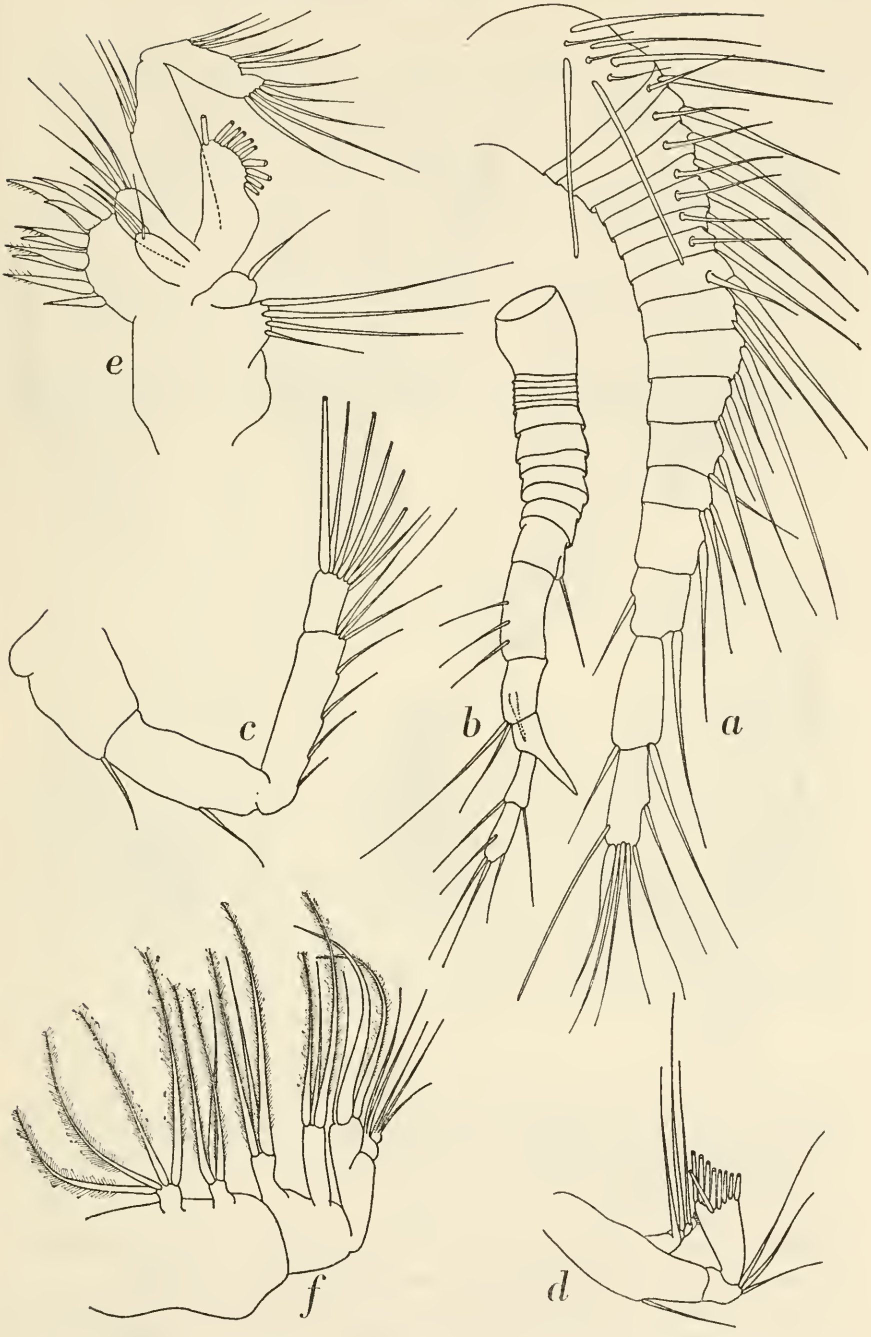


FIGURE 3.—*Pseudocyclops pacificus*, new species, loc. 709, ad. ♂, holotype: *a*, left antennule; *b*, right antennule; *c*, antenna; *d*, mandibular palp; *e*, maxillule; *f*, maxilla. (*a*, *c–f*, × 460; *b*, × 275.)

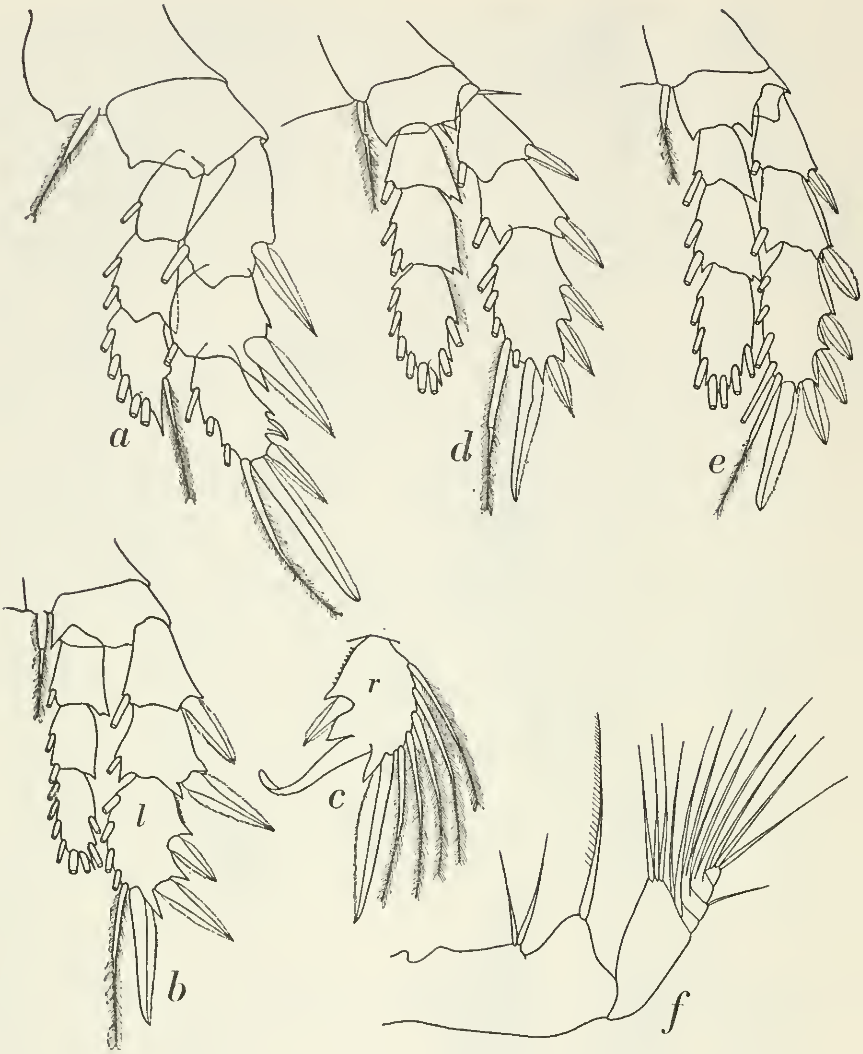


FIGURE 4.—*Pseudocyclops pacificus*, new species, loc. 709, ad. ♂, holotype: *a*, leg 1; *b*, left leg 2; *c*, 3rd segment exopodite leg 2, right side; *d*, leg 3; *e*, leg 4; *f*, maxillipede. (*a*, *f*, × 460; *b–e*, × 275.)

ternal lamina, and internal seta. The endopodite of leg 1 reaches just beyond the articulation between exopodal segments 2 and 3.

Leg 2 (fig. 4*b*) differs from leg 1 in following points: Internal spine on basis acutely pointed. Spine at external margin of 1st endopodal segment doubled, similar spine on 2nd endopodal segment small. 3rd endopodal segment with 4 internal, 2 apical, and 2 external setae. 2nd exopodal segment with well-developed spine at base of internal seta; spine at external margin flanked by two small spines. 3rd exopodal segment with 2 spines at external margin, 4 setae at internal margin and at apex with strong apical spine and internal seta. External and apical spines preceded by smaller spines. Length of apical spine slightly exceeds that of 3rd exopodal segment. 3rd exopodal segment of 2nd pair asymmetrically developed; that on left side has structure described above; on right side the 2nd (distal) external marginal spine greatly developed, curved backward (fig. 4*c*). Endopodite reaches slightly beyond middle of 3rd exopodal segment.

Leg 3 as 2nd, with exception of 3rd segment of exopodite, which has 3 external marginal spines. Distinct, slender spine on basis on left and right side of insertion of exopodite. Endopodites and exopodites of nearly same length (fig. 4*d*).

Leg 4 almost as 3rd. No spines occur near insertion of exopodite, but tooth between insertion of endopodite and exopodite well developed. 3rd endopodal segment with total of 7 setae, 3 at internal border, 2 at apex, and 2 at external border. Endopodite and exopodite of same length (fig. 4*e*).

5th legs complexly built (fig. 2*f*). Coxae of both sides fused. Right basis more or less triangular, carrying unsegmented endopodite and chelate exopodite, composed of communal segment, carrying articulating external spine, and two blades forming claw. Point of internal blade drawn out in fine filament, basal part with 2 setiform spines. Left basis either completely fused with coxa or of diminutive size. Left endopodite curiously shaped: external border deeply invaginated; apex with 4 setae, with strongly swollen bases, and some spines. Left exopodite with two strong but very unequal marginal spines and 3 curiously formed, lobated appendages representing segments or spines.

Color completely faded, opaque whitish.

Remarks.—The present new form is undoubtedly closely allied to *P. umbricatus* Giesbrecht, from which it easily may be differentiated by the structure of antennules and furca. The asymmetrical development of the 2nd pair of legs has not been described for any of the previously known species of this genus, but in the present instance it may represent an individual aberration, which I could not check since I had only one individual at my disposal.

P. pacificus undoubtedly inhabits the sandy parts of the reef and its presence in sponge washings must be considered as entirely accidental.

Family Acartiidae G. O. Sars, 1903

Genus *Acartia* Dana, 1846

Acartia (*Acanthacartia*) *tonsa* Dana, 1849

FIGURES 1*b*,*c*

Acartia tonsa Dana, 1849, p. 26; 1853, p. 1122; 1855, pl. 79 (fig. 4).—Giesbrecht, 1889, p. 25; 1892, pp. 508, 511, 518, 522, pl. 30 (figs. 7, 24, 34), pl. 43 (figs. 6, 10).—Dahl, 1894, p. 22.—Giesbrecht and Schmeil, 1898, p. 154.—Cleve, 1900, p. 44; 1900a, p. 143; 1901, p. 4; 1904, p. 355.—Foster, 1904, p. 75.—Esterly, 1905, p. 204, fig. 49.—Wolfenden, 1905, p. 1023.—Sharpe, 1910, pp. 407, 414, fig. 5.—Esterly, 1917, p. 393; 1919, p. 16.—Bigelow, 1922, p. 146, fig. 48.—Esterly, 1923, p. 420.—Steuer, 1923, p. 23, figs. 106–109.—Esterly, 1924, p. 105, figs. N, O.—Bigelow, 1926, p. 181.—Remy, 1927, pp. 31, 32; 1927a, pp. 169–186, figs. 1–3.—Russell, 1927, p. 245.—Esterly, 1928, pp. 272, 298.—Gurney, 1931, p. 217.—C. B. Wilson, 1932, p. 160, fig. 109.—Gurney, 1933, p. 373.—Rose, 1933, p. 276, fig. 348.—Steuer, 1933, pp. 272, 276.—Jespersen, 1934, p. 54.—Redeke, 1934, p. 39, figs. 2, 3; 1935, p. 315, figs. 1, 3, 5.—Fish and Johnson, 1937, p. 253.—Bigelow and Sears, 1939, p. 303.—Bërzins, 1940, p. 484.—Johnson, 1942, p. 28.—Davis, 1944, p. 3.—Vorstman, 1946, pp. 184–188, fig. 1.—Farran, 1948, p. 3, fig. 6.—Sutcliff, 1948, p. 234.—Jespersen, 1949, pp. 5, 8, 9.—Brodsky, 1950, p. 427, fig. 302.—Davis, 1950, p. 91.—Carvalho, 1952, p. 152.—Conover, 1956, pp. 156–233, figs. 1–29.—Deevey, 1956, p. 127.—Mäemets and Veldre, 1956, pp. 19, 85, pl. 10 (figs. 3–6).—Conover, 1957, pp. 65, 66.—Grice, 1960, pp. 220, 221.—Stock and de Vos, 1960, p. 204.

MATERIAL.—Loc. 194–E–5, 1 ad. ♀, 0.97 mm. Loc. 592, 1 ad. ♂, 0.93 mm.

The area of distribution of *Acartia tonsa* is very extensive and includes tropical, subtropical, and temperate parts of the Atlantic and Pacific oceans. Its pattern of distribution, which will not be given in detail here, shows that the species is very tolerant in regard to the temperature of surface waters in which it prefers to live. The marked tendency, in the Atlantic at least, to penetrate into estuarine waters, is well known, with the result that, in addition to purely marine habitats, the species also has been found in Ringkøbing Fjord in Denmark (Jespersen, 1934); the Baltic area (Bërzins, 1940; Vorstman, 1946); various brackish localities in the Netherlands (Redeke, 1934, 1935); the Caen Canal in France (Remy, 1927); and the estuary of the Amazon River in Brazil (Dahl, 1894). Its occurrence among the surface lagoon plankton of Ifaluk is not surprising at all, but its occurrence at locality 592, where a sand sample was collected about 340 feet from the reef margin, is purely accidental; it must have been washed into a small tidal pool by the flood water.

Order Cyclopoida

Suborder Gnathostoma

Family Oithonidae Dana, 1853

Genus *Oithona* Baird, 1843

Oithona (Dioithona) oculata Farran, 1913

Oithona oculata Farran, 1913a, p. 188, pl. 30 (figs. 8, 9), pl. 31 (figs. 2–9).—Rosendorn, 1917, p. 37, figs. 23a–g.—Kiefer, 1929, p. 10.—Dakin and Colefax, 1933, p. 208; 1940, p. 116, figs. 204a, b.—Sewell, 1947, p. 254.—Tanaka, 1960, p. 60, pl. 26, figs. 5–10.

Dioithona oculata.—Kiefer, 1935, p. 326.

MATERIAL.—Loc. 194–E–5, a large number of adult females, some males, and developmental stages: ad. ♀♀, 0.53–0.60 mm.; ad. ♂♂, 0.55–0.60 mm.

Oithona minuta T. Scott, 1894, *O. rigida* Giesbrecht, 1896, *O. oculata* Farran, 1913, and *O. alia* (Kiefer, 1935) were united by Kiefer (1935, p. 322) in the genus *Dioithona* Kiefer, 1935, type species *D. alia* Kiefer, 1935. The species of his new genus are characterized by the presence of two setae on the (only) free segment of leg 5. One of these setae is developed as in the genus *Oithona* (i.e., fine and long), the second seta is short and spiniform; the development, moreover, seems to differ in the 4 members of the new genus. Though recognizing the need for a further subdivision of the genus *Oithona* Baird, 1843, sensu lato, I really must object to splitting off genera because of the presence or absence of a very small seta, of very variable length too, as long as this character is not coupled with such—and in my opinion more important—characters as the development of the rostrum, setation of the mandibular basipodite, and setation of the swimming legs. I have, therefore, provisionally reduced the status of Kiefer's genus to subgeneric level, awaiting a more thorough revision of the Oithonidae.

O. oculata Farran appears to be very closely allied to *O. alia* (Kiefer, 1935) and only a very careful examination of the present specimens has convinced me that they really belong to Farran's form, despite the differences in length: Farran's female specimens are 0.90 mm., the male 0.65 mm.; Rosendorn's female specimens are slightly shorter, 0.80 mm.; Tanaka's only female specimen measured 0.80 mm.

Though smaller, the Ifaluk specimens are in complete conformity with Farran's, Rosendorn's, and Tanaka's descriptions; they differ from *O. alia* in the following points:

1. Bilobated gangliac mass in frontal part of head very prominent feature in *O. oculata* and fully absent in *O. alia*.
2. Endopodite of leg 4 comparatively long, reaching middle of 3rd exopodal segment of that leg in *O. oculata*. In *O. alia* that endopodite

is shorter and just reaches insertion of 2nd internal seta on 3rd exopodal segment (same condition is in Tanaka's specimen of *O. oculata*).

3. Apical spine on 3rd exopodal segment of leg 4 long in *O. oculata*, slightly longer even than whole exopodite. In *O. alia* it is much shorter and reaches the length of the two apical exopodal segments combined.

The variability of the features 2 and 3 is unknown and *O. alia* might well prove to be the Atlantic form of *O. oculata*, the visibility of the gangliac mass being dependent upon the condition of fixation.

O. oculata is distributed rather irregularly over the tropical and subtropical parts of the Indian and Pacific Oceans: it has been recorded from Samoa in the Pacific Ocean (Rosendorn, 1917); from Christmas Island in the Indian Ocean (Farran, 1913a); from the coastal waters off New South Wales, Australia (Dakin and Colefax, 1933, 1940); from Nancowry Harbour in the Nicobar Islands (Sewell, 1947, 1 ad. ♂); and from south of the Cape of Good Hope (Tanaka, 1960).

Family Cyclopinidae G. O. Sars, 1913

This family, in its present form, comprises a fairly large number of closely related genera, distinguished by such characters as the segmentation and setation of leg 5, setation of legs 1 to 4, and the development or oral appendages and antennules.

The various genera have been revised by Lindberg (1953) and may, with the genera and species added since, be given as follows:

Subfamily CYCLOPININAE Kiefer, 1927
  Genus *Cyclopina* Claus, 1863
    C. gracilis Claus, 1863 (type species)
    C. norvegica Boeck, 1864
    C. schneideri T. Scott, 1903 (=*C. brevifurca* G. O. Sars, 1913)
    C. pygmaea G. O. Sars, 1918
    C. brachystylis G. O. Sars, 1921
    C. steueri Früchtl, 1923
    C. ensifera Grandori, 1926
    C. pacifica Smirnov, 1935
    C. latipes Schäfer, 1936
    C. kieferi Schäfer, 1936
    C. kieferi elongata Herbst, 1953
    C. esilis Brian, 1958
    C. vachoni Nicholls, 1939
    C. laurentica Nicholls, 1939
    C. mediterranea Steuer, 1940
    C. psammophila Steuer, 1940
    C. rotundipes Herbst, 1952
    C. crassisetosa Herbst, 1953
    C. phoenicica Lindberg, 1953
    C. adriatica Petkovski, 1955
    C. hadžii Petkovski, 1955
    C. heterospina Shen and Bai, 1956
  Genus *Cyclopinella* G. O. Sars, 1913
    C. tumidula G. O. Sars, 1913 (type species)
    Cyclops glacialis Brady, 1910
  Genus *Cyclopetta* G. O. Sars, 1913
    C. difficilis G. O. Sars, 1913 (type and sole species)
  Genus *Paracyclopina* Smirnov, 1935
    P. nana Smirnov, 1935 (type species)
    Cyclopina longifurca Sewell, 1924
    C. intermedia Sewell, 1924
    C. minuta Sewell, 1934
  Genus *Cyclopinodes* C. B. Wilson, 1932
    Cyclopina elegans T. Scott, 1894 (type species)
    C. pusilla G. O. Sars, 1905
    C. barentsia Smirnov, 1935

- Genus *Cyclopinopsis* Smirnov, 1935
  - *C. curticauda* Smirnov, 1935 (type species)
  - *C. brasiliensis* Herbst, 1955
- Genus *Cyclopidina* Steuer, 1940
  - *Cyclopina euacantha* G. O. Sars, 1918 (type and sole species)
- Genus *Pseudocyclopina* Lang, 1946
  - *Cyclopina belgicae* Giesbrecht, 1902 (type species)
  - *C. phallusiae* Hansen, 1923 (probable)
  - *P. neglecta* (Herbst, 1952)
- Genus *Neocyclopina* Herbst, 1952
  - *N. reducta* Herbst, 1952 (type and sole species)
- Genus *Cyclopinoides* Lindberg, 1953
  - *Cyclopina longicornis* Boeck, 1872 (type species)
  - *Cyclops littoralis* Brady, 1872
  - *Cyclopina dilatata* G. O. Sars, 1921
  - *Cyclopina bisetosa* Grandori, 1926
- Genus *Cyclopicina* Lindberg, 1953
  - *Cyclopina longicaudata* T. Scott, 1901 (type and sole species)
- Genus *Metacyclopina* Lindberg, 1953
  - *Cyclopina harpacticoides* Klie, 1949 (type species)
  - *M. roscoffensis* Božić, 1953
- Genus *Hemicyclopina* Herbst, 1953
  - *H. setifera* (Herbst, 1952) (type species)
  - *H. kliei* Herbst, 1953
- Genus *Procyclopina* Herbst, 1955
  - *P. polyarthra* Herbst, 1955 (type and sole species)

Subfamily PTERINOPSYLLINAE Kiefer, 1927

- Genus *Pterinopsyllus* Brady, 1880
  - *Lophophorus insignis* Brady, 1878 (type species)
  - *P. egregius* Giesbrecht, 1900
  - *P. illustris* Giesbrecht, 1900

The position of *Cyclopina agilis* C. B. Wilson, 1932, is doubtful; the species needs reexamination because some of Wilson's statements and figures are certainly wrong. At present the species cannot find a place in any of the above-mentioned genera. *Cyclops ovalis* Brady, 1872, was described so wantingly by its author that even its place among the Cyclopininae is doubtful. According to Smirnov (1935, p. 310), the identification of *Cyclopina brevifurca* G. O. Sars, 1913 with *Cyclopina schneideri* T. Scott, 1903 (cf. G. O. Sars, 1918, p. 209), is debatable, with the result that the genus *Cyclopina* may contain one more species, *Cyclopina brevifurca* G. O. Sars, 1913. The type of the genus *Cyclopicina* is named *Cyclopina longifurcata* in the text of T. Scott's publication, but the name *Cyclopina longicaudata* is mentioned on page 280 in the explanation of the figures. The species was subsequently mentioned as *Cyclopina longicaudata* T. Scott by Van Breemen (1908, p. 172), the first author to mention this species after T. Scott; it seems quite clear that it should now be referred to as *Cyclopicina longicaudata* (T. Scott, 1901). This is the more fortunate since the species can easily be confused with *Cyclopina longifurca* Sewell, 1924, now in the genus *Paracyclopina*.

Lang's use of the generic name *Pseudocyclopinodes* for *Pseudocyclopina* (Lang, 1946, p. 10) is very distinctly a lapsus calami; the correct spelling is the latter. The first spelling is used in his definition of the genus on page 12 and in the key on page 15.

The following key may serve to distinguish the females of the various genera. Among several genera the males are unknown and

I failed to find a satisfactory grouping of the known males on which to base a key. The following key has been adopted from Lindberg, 1953, but, because several species have been described since the publication of his paper, some of the genera defined therein need reconsideration. The genera *Neocyclopina* Herbst, 1952, and *Metacyclopina* Lindberg, 1953, can be immediately singled out: *Neocylopina* because of the reduction of the segmentation of legs 1 to 4; *Metacyclopina* because of the aberrant shape of the body. Both, nevertheless, have been included in the following key.

Key to the Genera of Cyclopinidae

1. Endopodite of antenna 1-segmented, so that the whole antenna is composed of 3 segments. At least 2 of the appendages of the endopodite of leg 4 reduced, represented by short spines . . . . . . **Pterinopsyllus** Brady

   Endopodite of antenna 2-segmented, whole antenna composed of 4 segments. Appendages of endopodite of leg 4 normally developed setae or spines . . 2

2. Proximal segment of leg 5 fused to 5th thoracic somite, so that leg 5 is composed of 1 free segment, bearing 4 or 3 appendages. External seta of proximal segment, if present, inserting on slight ridge on ventral aspect of 5th thoracic somite 3

   Proximal part of leg 5 free from 5th thoracic somite, present as 1 or 2 free segments, bearing an internal spine or external seta; leg 5 consequently composed of 2 or 3 free segments 4

3. Free segment of leg 5 with a total of 4 appendages . **Paracyclopina** Smirnov

   Free segment of leg 5 with a total of 3 appendages . **Cyclopetta** G. O. Sars

4. Leg 5 composed of 2 free segments 5

   Leg 5 composed of 3 free segments 12

5. Terminal segment of leg 5 with 3 appendages 6

   Terminal segment of leg 5 with 4 or 5 appendages 8

6. Armature of terminal segment of leg 5 composed of 3 spines.
   Cyclopidina Steuer

   Armature of terminal segment of leg 5 composed of 2 spines flanking a median seta 7

7. Abdomen short, antennule 19-segmented. Endopodite of maxillipede long. All setae of furcal rami inserting apically . . . . . **Procyclopina** Herbst

   Abdomen slender, antennule 10- to 13-segmented. Endopodite of maxillipede short. At least one of the setae of the furcal rami inserting along external margin of furcal ramus (compare also *Cyclopina vachoni* Nicholls).
   Cyclopina Claus

8. Terminal segment of leg 5 with a total of 5 appendages.
   Cyclopicina Lindberg

   Terminal segment of leg 5 with a total of 4 appendages 9

9. Exopodite of mandible 3-segmented 10

   Exopodite of mandible 4-segmented 11

10. Endopodites of legs 1 to 4, 2-segmented, exopodites of legs 1 and 4, 2-segmented, of legs 2 and 3, 3-segmented . . . . . . **Neocyclopina** Herbst

    Exopodites and endopodites of legs 1 to 4 all 3-segmented.
    Cyclopinopsis Smirnov

11. Segment 2 of endopodite leg 1 with 1 internal seta; segment 3 with a total of 5 setae . . . . **Hemicyclopina** Herbst

Segment 2 of endopodite leg 1 with 2 internal setae; segment 3 with a total of 6 setae . . . . **Pseudocyclopina** Lang

12. 2nd segment of endopodite leg 1 with 2 setae . **Cyclopinodes** C. B. Wilson
2nd segment of endopodite leg 1 with 1 seta 13

13. Body elongate, cephalothorax merging almost imperceptibly into abdomen. **Metacyclopina** Lindberg
Cephalothorax and body distinctly separate 14

14. Mandibular exopodite reduced, represented by 1 seta. Some setae of the 3rd segment of legs 1 to 3 replaced by spines, antennules 12-segmented. **Cyclopinella** G. O. Sars
Mandibular exopodite 4-segmented, not reduced. 3rd segment of endopodite legs 1 to 3 with normally developed setae, antennules 18–19-segmented . . . . **Cyclopinoides** Lindberg

Genus *Cyclopina* Claus, 1863

In addition to the structure of the oral appendages and the setal and spinal formulae of the legs, the distinctions among the many species of this genus are based to a large degree upon such characteristics as the development of the spines on the terminal segment of leg 5, the shape of that segment, the length of the furcal rami, and the place of insertion and development of the marginal setae. Very likely this group of characters is subjected to a certain amount of variation, as appears from the inspection of a group of representatives of one of the more common forms. The total body length, as well as the proportional lengths of cephalothorax and abdomen, may be variable from natural courses or may be influenced by contraction of somites as a result of fixation. It seems very possible, therefore, that the number of species will be reduced when more specimens, especially of the less common forms, become available. The following key, adapted from Lindberg (1953), may serve to distinguish the females of *Cyclopina;* its value is limited and comparison with reliable descriptions remains a very necessary check.

Key to the Females of *Cyclopina*

1. Furcal rami about as long as broad or broader than long 2
Furcal rami distinctly longer than broad 4

2. Internal spine of terminal segment of leg 5 with lamelliform edges, ovate; no spinule at the base of the external spine on that segment. **C. schneideri** T. Scott
Internal spine on terminal segment of leg 5 without lamelliform edges, slender; a small spinule at the base of the external spine on that segment. 3

3. External spine on terminal segment of leg 5 short, about as long as apical segment. Apical segment of mandibular exopodite with 2 setae, one of which is considerably lengthened and slightly swollen, bearing a tuft of hairs at the apex . . . . **C. laurentica** Nicholls
External spine of terminal segment of leg 5 long and slender, more than 1½ times as long as terminal segment. Condition of mandibular exopodite unknown . . . . **C. heterospina** Shen and Bai

4. Furcal rami about 6 times as long as broad . . . . **C. pygmaea** G. O. Sars
Furcal rami distinctly shorter, not more than 4 times as long as broad . . 5
5 Antennule composed of 13 free segments . . . . . . **C. pacifica** Smirnov
Antennule composed of 10 free segments 6
6. Furcal rami about twice as long as broad or slightly shorter 7
Furcal rami at least 2½ times as long as broad or longer 12
7. Little or no difference in size between internal and external spine of terminal segment of leg 5 10
Internal spine of terminal segment of leg 5 longer than external spine, or external spine longer than internal spine 8
8. Internal spine of terminal segment of leg 5 longer than external spine. **C. mediterranea** Steuer
External spine of terminal segment of leg 5 longer than internal spine . . 9
9. External spine of terminal segment of leg 5 about twice as long as internal spine or longer. Furca as long as anal somite or shorter; seta at external furcal border inserting at middle of that border. **C. brachystylis** G. O. Sars
External spine of terminal segment of leg 5, 1¼ to 1½ times as long as internal spine. Furca longer than anal somite; seta at external border of furca inserting proximally in middle of that border . . . . . **C. kieferi** Schäfer
10. 1st segment of endopodite of mandible with 2 setae . . . **C. vachoni** Nicholls
1st segment of endopodite of mandible with 3 setae 11
11. Number of setae on the 3rd exopodal segment of legs 1 to 4 is 4.5.5.5. **C. adriatica** Petkovski
Number of setae on the 3rd exopodal segment of legs 1 to 4 is 4.5.4.4. **C. psammophila** Steuer
12. Internal spine on terminal segment of leg 5 longer than external spine. **C. latipes** Schäfer
External spine on terminal segment of leg 5 longer than internal spine . . 13
13. External spine of terminal segment of leg 5, 2½–3 times as long as internal spine . . . . **C. esilis** Brian
External spine on terminal segment of leg 5 twice as long as internal spine or shorter 14
14. No internal seta on coxa and no external seta on basis of leg 4. **C. ensifera** Grandori
Internal and external seta on coxa and basis of leg 4 present 15
15. Furca 3–4 times as long as wide 16
Furca not more than 2½ times as long as wide 19
16. Seta at external furcal margin inserting on proximal third of that margin, short and nude . . . . **C. gracilis** Claus
Seta at external furcal border inserting halfway along that margin or slightly lower; seta either nude or plumose 17
17. Seta at external margin of furcal border inserting distinctly under the middle of that border, short and plumose . . . . **C. phoenicica** Lindberg
Seta at external furcal border placed halfway along that border or very slightly above the middle 18
18. Seta at external furcal border plumose; apical furcal setae thickened. Terminal segment of leg 5 ovate, internal and external spine on that segment of about the same length . . . . **C. crassisetosa** Herbst
Seta at external furcal border nude, placed slightly above middle of external margin; apical furcal setae normally developed. Terminal segment of leg 5 elongate, external spine of that segment longer than internal spine. **C. kieferi elongata** Herbst

19. Terminal segment of leg 5 elongate, about twice as long as broad 20
Terminal segment of leg 5 ovate or circular, as long as broad or 1½ times as long as broad 21

20. Big species, about 0.5 mm. total length; sacs with many eggs. **C. norvegica** Boeck
Small species, total length about 0.3 mm; sacs with 3–5 eggs. **C. hadžii** Petkovski

21. Antennules short, reaching about ⅓ the length of the cephalothorax. **C. rotundipes** Herbst
Antennules slightly longer, reaching the line of fusion between head and 1st thoracic somite. (Denticulate lamella at the ventral ends of the genital somite, the 3rd abdominal somite, and the furca.) . . **C. steueri** Früchtl

Cyclopina steueri Früchtl, 1923

FIGURES 1*d–f*

Cyclopina steueri Früchtl, 1923, pp. 450, 453; 1924, pp. 74, 86, figs. 49–58.—Kiefer, 1929, p. 17.—Gurney, 1933, p. 16.—Schäfer, 1936, p. 234.—Steuer, 1940a, p. 8.—Sewell, 1949, pp. 22, 23, 162, 176, 185.—Lindberg, 1953, pp. 319, 324.—Herbst, 1955, p. 220, figs. 31e–m.

MATERIAL.—Loc. 592, 1 ad. ♀, 0.34 mm.

NOTES.—Rostrum not visible from above. Frontal part of head in dorsal aspect broadly rounded; in lateral aspect frontal part very obtuse. Rostrum strongly curved, pointing downwards, bluntly pointed. The number of spines on the 3rd exopodal segment of legs 1 to 4 is 4.4.4.3; the number of setae, 4.5.5.5. Leg 5 (fig. 1*f*) 2-segmented, the basal segment well developed, with a long external seta; apical segment ovate, internal and external spine of about the same length and as long as the apical segment; median seta twice as long as terminal segment, plumose. External margin of terminal segment with spiniform hairs.

Cyclopina steueri is based on a single female specimen, 0.41 mm. long, captured in a surface plankton haul at the eastern exit of Sungi Manumbai in the Aru Archipelago (type locality). A female specimen, 0.4 mm. long, from the sandy beach of Inhabela on the Atlantic coast of Brazil, was referred doubtfully to Früchtl's species by Herbst (1955). The present specimen, in addition to being slightly smaller, agrees fairly well with Früchtl's detailed description except for the following two points:

1. Denticulated lamella along ventral part of distal margins of genital somite, 3rd abdominal somite and furca very imperfectly developed and almost invisible. Herbst also failed to observe the above-mentioned denticulation in his specimen.

2. The anal somite here appears to be slightly longer; it is as long as the preceding (4th abdominal) somite and only slightly shorter than the furcal rami.

C. steueri appears to be very closely allied to *C. rotundipes* Herbst, 1952; both species, after the study of more material, may prove to be identical. A single specimen of *C. steueri* occurred in a sand sample taken some 340 feet from the reef margin at Falarik, Ifaluk Atoll.

Cyclopina brachystylis G. O. Sars, 1921

FIGURES 5–7

Cyclopina brachystylis Sars, 1921, p. 103, pl. 69 (fig. 2).—Früchtl, 1924, p. 85.—Pesta, 1927, p. 38.—Kiefer, 1929, p. 18.—Smirnov, 1935, p. 207, figs. 6, 7.—Schäfer, 1936, pp. 230, 234, figs. 18, 19.—Nicholls, 1939, p. 308.—Steuer, 1940a, p. 8.—Lang, 1946, p. 13.—Sewell, 1949, pp. 22, 23, 162, 164, 165, 190, 191.—Lindberg, 1953, pp. 319, 323.

MATERIAL.—Loc. 589, 1 ad. ♀, 0.42 mm.; 1 ♀ cop. stage V, 0.42 mm.; 1 juv., 0.23 mm.

DESCRIPTION.—The following is based on the adult female specimen, which has been figured and dissected; the appendages have been mounted on slides.

Adult female, total length 0.42 mm. Proportional length of cephalothorax and abdomen is 17:11; greatest diameter 0.15 mm.

General shape of body cyclopoid: cephalothorax well developed, ovoid in dorsal aspect; abdomen distinctly set off from cephalothorax, slender (figs. 5*a,b*). Cephalothorax in dorsal view rounded anteriorly and posteriorly. Head and 1st thoracic somite fused to form cephalic somite, which occupies considerable part of cephalothorax; greatest diameter of cephalothorax at end of cephalic somite. Cephalothorax narrows gradually anteriorly, slightly constricted in oral region and very distinctly contricted at insertion of antennules. Base of rostrum visible between basal parts of antennules; rostrum itself not visible from above. Back, in lateral aspect, almost straight; head smoothly rounded into rostrum, which forms triangular mass with rather broad base, apex pointing downward and obtuse. No indication of line of fusion between head and 1st thoracic somite, neither dorsally nor laterally. Thoracic somites 2 and 3 of about same length; 4th thoracic somite small, especially in dorsal aspect; dorsally and laterally it is broadly rounded. The parts of the cephalothorax have the following proportional lengths:

head+1	2	3	4
66	13	15	6=100

5th thoracic somite small, in dorsal aspect with small but distinct laterally produced wings, running into a small, laterocaudal point. Genital somite composed of abdominal somites 1 and 2, no line of fusion visible, long and slender. In dorsal aspect genital somite appears to have lateral swelling in the proximal third (fig. 6*a*). Abdominal somites 3 and 4 of nearly same length; anal (5th abdominal)

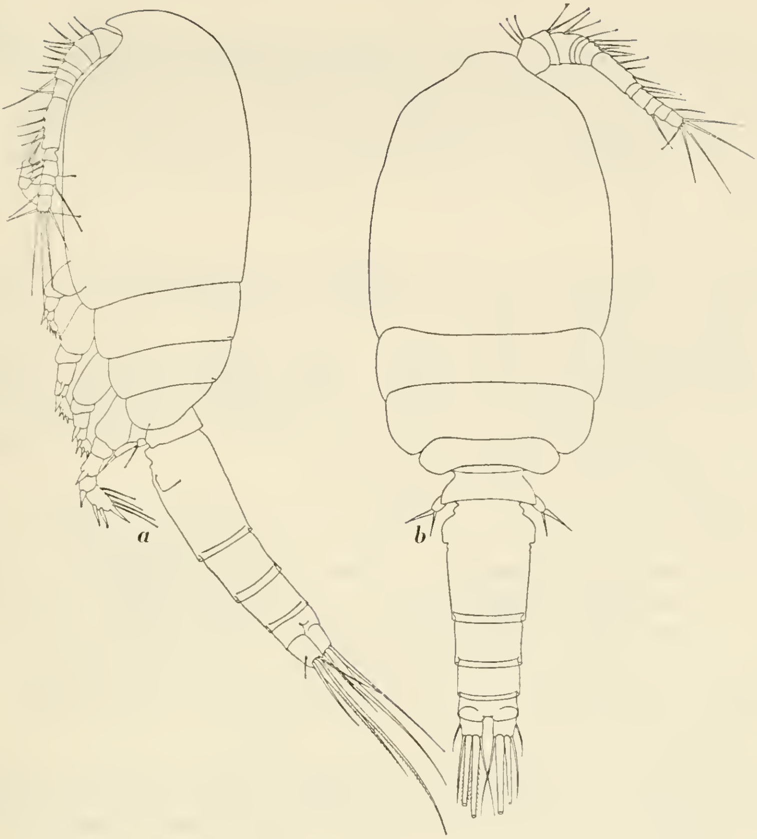


Figure 5.—*Cyclopina brachystylis* G. O. Sars, loc. 589, ad. ♀: *a*, whole animal, lateral view from left side; *b*, same animal, dorsal view. (× 210.)

somite much smaller; anal flap indistinct. There is a fine hyaline lamella along the distal ends of all abdominal somites which, as far as I could make out, is smooth. The various abdominal somites have, with the furca, the following proportional lengths:

somite	5	1+2	3	4	5	furca
	9	38	19	17	8	9=100

Furcal rami parallel, each ramus slightly longer than wide (proportions 4:5). There are 5 marginal setae and 1 appendicular seta on each ramus (fig. 6*b*). Appendicular seta and setae 1 and 4 small and fine; appendicular seta very short, nude; setae 1 and 4 longer, about half length of apical setae 2 and 3, plumose. Setae 2 and 3 strong and lengthened, especially 2nd, which reaches ⅔ length of abdomen; seta 3 is slightly shorter. Both are set with dispersed, spiniform hairs.

Antennules 10-segmented, 6th free segment very long. Total length of antennule is equal to about half length of cephalic somite. Segmentation of antennule results from fusion of various segments of originally 25-segmented antennula in following way:

$$\underset{1}{1}\quad \underbrace{2+3}_{2}\quad \underbrace{4+5+6+7}_{3}\quad \underset{4}{8}\quad \underset{5}{9}\quad \underbrace{10+11+12+13+14+15+16+17+18}_{6}\quad \underbrace{19+20+21}_{7}$$

$$\underset{8}{22}\quad \underset{9}{23}\quad \underbrace{24+25}_{10}$$

Segment 6 shorter than combined lengths of segments 7–10; setation of antennule shown in figure 6*c*.

Antenna 4-segmented, exopodite fully absent. Coxa with sensory internal and normal external seta. Bases with internal seta halfway along its border. Endopodal segment 1, with 1+3 setae (1 internal, 3 at end of internal margin); endopodal segment 2, with 5 marginal setae and 1 appendicular seta (fig. 6*d*).

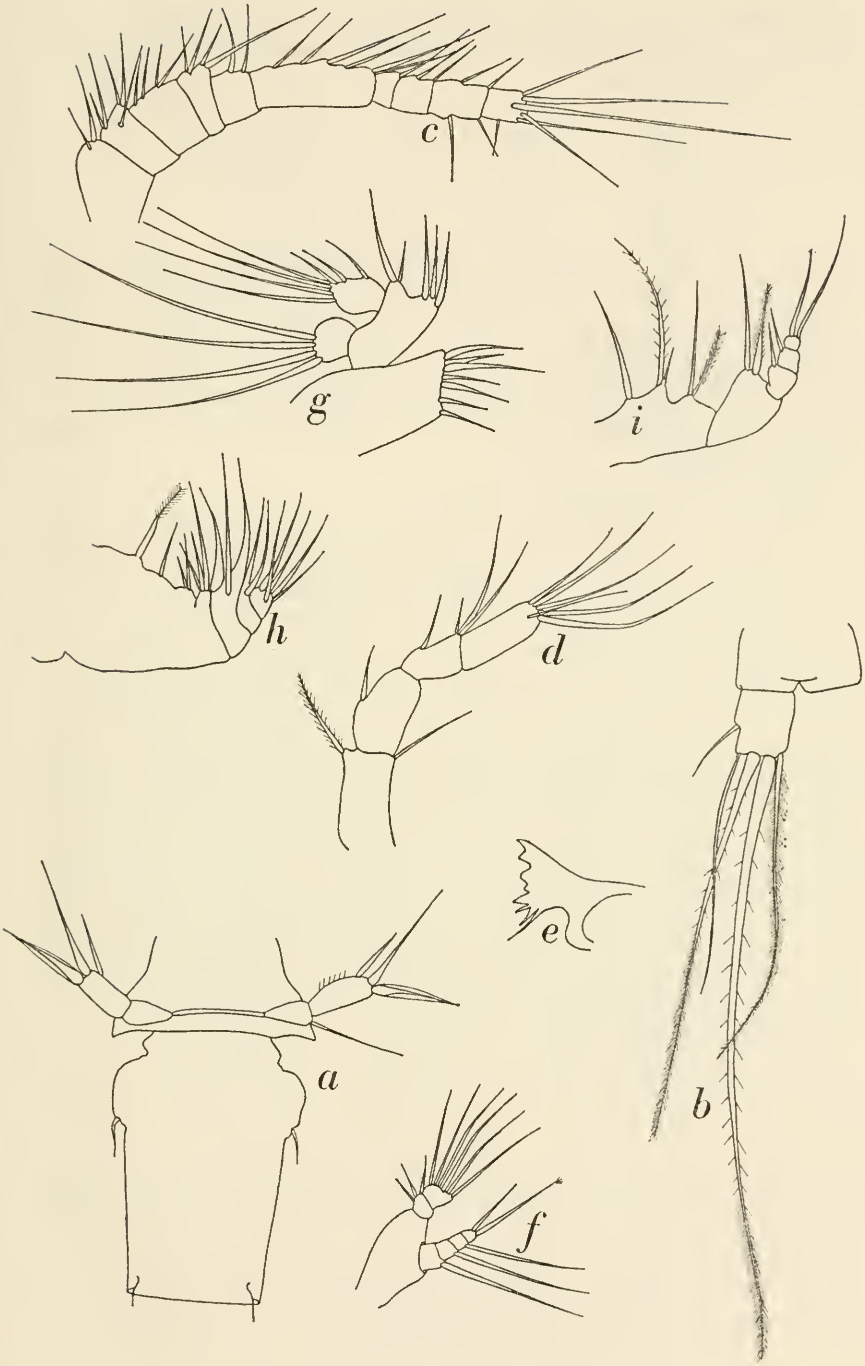
Mandibular palp in my dissection detached from praecoxa and exopodite partly concealed. Cutting edge of praecoxa (fig. 6*e*) with 7 strong teeth and basal seta. Fused coxa and basis large, without setae. Exopodite well developed, 4-segmented; number of setae 1, 1, 1, 2, respectively. Of the 2 setae on the apical (4th) exopodal segment, one is lengthened, slightly thickened, and crowned by a tuft of hairs. Endopodite small, 2-segmented; the setae number 3 and 6 respectively (fig. 6*f*).

Maxillule (fig. 6*g*) with well-developed arthrite with 7 marginal, spiniform setae. Coxa and basis fused, endites weakly indicated and with 3 and 2 setae respectively. Exopodite small, rounded, with 4 strong, plumose setae; endopodite unsegmented, with a total of 7 setae, 3 of which are small.

Maxilla (fig. 6*h*) with indistinctly separated praecoxa and coxa; each with 2 scarcely elevated endites, bearing 1, 1, 2, and 3 setae respectively; the distal endite is best developed. Basal endite well developed, with 2 strong, curved spines, one of which is coalescent with the lobe, and a seta. There are 2 more segments, probably representing a 2-segmented endopodite, with 2 and 5 setae respectively.

Coxa of maxillipede with 3 lobes, bearing 1, 2, and 2 setae respectively. Basis large, triangular, with 2 setae. Endopodite short, 3-segmented, bearing 1, 1, and 2 setae respectively (fig. 6*i*).

FIGURE 6.—*Cyclopina brachystylis* G. O. Sars, loc. 589, ad. ♀: *a*, 5th thoracic somite and genital somite, ventral view; *b*, left furcal ramus with setae, dorsal view; *c*, antennule; *d*, antenna; *e*, cutting edge of mandibular praecoxa; *f*, mandibular palp; *g*, maxillipede; *h*, maxilla; *i*, maxillipede. (× 460.)


c
g
i
h
d
e
a
b
f

The various details of legs 1–4 can best be taken from figures 7*a–d* as well as from the following formula (arabic numerals represent setae; roman, spines):

	endopodite	*exopodite*
leg 1	1.1.411	1+I.1+I.3(1+I)III
leg 2	1.2.411	1+I.1+I.4(1+I)III
leg 3	1.2.411	1+I.1+I.4(1+I)III
leg 4	1.2.311	1+I.1+I.4(1+I)II

Leg 5 (fig. 6*a*) 2-segmented; basal segment small, with a single external seta. Terminal segment twice as long as basal segment, 3 times as long as wide. External spine large, with distinct hyaline lamella; internal spine slightly more than half as long as external spine, lamella indistinct. Median seta short and nude, basis thickened. Internal margin of terminal segment with some dispersed, spiniform hairs.

Color faded, transparently white.

Remarks.—The identification is based mainly on the segmentation of the antennule, the setal and spinal armature of the legs, the shape and armature of leg 5, and the structure and length of the furca.

Cyclopina brachystylis was originally described from female specimens from the Norwegian south and west coast, including the Trondheim Fjord, by G. O. Sars (1921); no exact type locality can be given. The females in Sars' material measured 0.56 mm. The species was not described completely; in addition to a drawing of the whole animal, only details of the antennules, the 5th leg, and the furca are illustrated. No particulars of the oral appendages or the legs are given. The species was mentioned afterwards by Schäfer (1936) from the Helgoland area of Germany, between algae in 5–8 m. depth. Sars' specimens were all from moderate depth, varying between 10 and 50 fathoms; the species never occurred in the littoral zone. Though no complete description of the female has been published by Schäfer, it seems very likely, due to the proximity of the localities, that he really studied Sars' form. Schäfer also includes a few notes on the male; his specimens measured 0.49 mm. (♀) and 0.38 mm. (♂). Smirnov (1935) records both sexes from the Vladivostok area, the only Pacific record so far known. His specimens measured 0.49–0.52 mm. He also includes some particulars of the male in his description, but as the structure of leg 5 of his male specimen differs widely from that of Schäfer's male specimens, the whole record seems rather doubtful. A complete redescription of Norwegian specimens of *Cyclopina brachystylis*, including particulars of mouth parts and legs, is highly desirable.

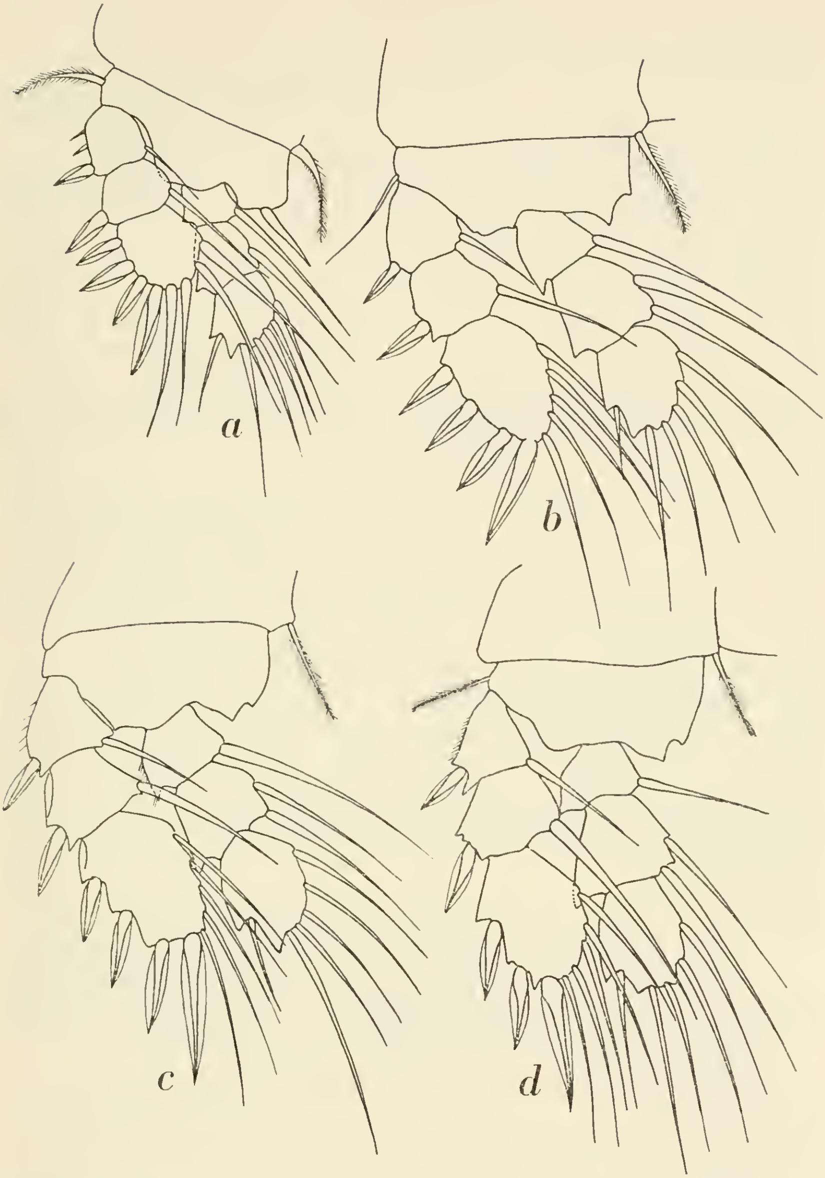


FIGURE 7.—*Cyclopina brachystylis* G. O. Sars, loc. 589, ad. ♀: *a*, leg 1; *b*, leg 2; *c*, leg 3; *d*, leg 4. (× 625.)

Family Cyclopidae Dana, 1853

Representatives of only the subfamily Halicyclopinae occur in the Ifaluk collection; this subfamily can be distinguished from the other subfamilies of the Cyclopidae with the aid of the following key (adapted from Kiefer, 1929):

1. Terminal (or only free) segment of leg 5 of female bearing 4 appendages. HALICYCLOPINAE Kiefer
   Terminal (or only free) segment of leg 5 bearing 3, 2, or 1 appendages . . 2
2. Terminal (or only free) segment of leg 5 of female with a total of 3 appendages. EUCYCLOPINAE Kiefer
   Terminal (or only free) segment of leg 5 bearing 2 or 1 appendages. CYCLOPINAE Dana

The subfamily Halicyclopinae at present includes the following genera: *Euryte* Philippi, 1843 (type species *E. longicauda* Philippi, 1843), *Halicyclops* Norman, 1903 (type species *Cyclops aequoreus* Fischer, 1860), *Neocyclops* Gurney, 1927 (type species *N. salinarum* Gurney, 1927) and *Pareuryte* Herbst, 1952 (type species *P. remanei* Herbst, 1952). The genus *Pareuryte* Herbst is evidently identical with Sewell's genus *Eurycyclops* (Sewell, 1949, p. 36), to which genus two species are attributed, *E. magna* Sewell, 1949, and *E. parva* Sewell, 1949. Though none of Sewell's species is identical with Herbst's *Pareuryte remanei*, both genera are clearly synonymous as shown by a comparison of the descriptions of the genera in both Sewell's and Herbst's papers. The type of Herbst's genus, by monotypy, is *P. remanei;* Sewell failed to indicate a distinct type for the new genus *Euryclops*, the description of which was published in 1949, with the result that, unfortunately, it cannot be accepted and must be dropped in favor of *Pareuryte* Herbst, 1952. This genus consequently contains the species *P. remanei* Herbst 1952 (type species), *P. magna* (Sewell, 1949), and *P. parva* (Sewell, 1949).

The genera of the subfamily Halicyclopinae can be distinguished as follows:

1. Leg 5 composed of a terminal segment and a basal part, more or less fused to the ventral surface of the 5th thoracic somite, leg 5 consequently composed of 2 more or less free segments . . . . **Halicyclops** Norman
   Leg 5 composed of a terminal segment, an intermediate segment (bearing an external seta) and a basal part, fused to the ventral surface of the 5th thoracic somite 2
2. Mandibular palp fully reduced; ♀ with 8-segmented antennules. **Neocyclops** Gurney
   Mandibular palp, though more or less reduced, present. Antennules 12–21-segmented 3
3. Mandibular palp present as a small, rounded eminence, bearing 3 well-developed setae. ♀ with 18- to 21-segmented antennules . . . **Euryte** Philippi
   Mandibular palp present as a small, rounded knob, bearing 1 seta or 1 seta and a very small spine. ♀ with 12-segmented antennules. **Pareuryte** Herbst

Representatives of only the genus *Euryte* occur in the present collection.

Genus *Euryte* Philippi, 1843

Type species: *Euryte longicauda* Philippi, 1843.

Sewell (1949, p. 35, fig. 4) described a female *Euryte* as *Euryte* spec., characterized by 18-segmented antennules and the structure of the mandibular palp, composed of a small knob bearing 1 seta. So far as the meager details given in Sewell's description allow it to be stated, the species is a typical *Euryte,* the aberrant structure of the mandibular palp being the result of damage during dissection (Sewell saw only one specimen). The various species of *Euryte* are listed below:

FEMALES	MALES
E. longicauda Philippi, 1843	*E. longicauda* Philippi, 1843
E. longicauda var. *minor* T. Scott, 1905a	*E. longicauda* var. *minor* T. Scott, 1905a
E. robusta Giesbrecht, 1900	*E. robusta* Giesbrecht, 1900
E. similis T. Scott, 1912	
E. curticornis G. O. Sars, 1913	
E. brevicauda Sewell, 1949	
E. spec., Sewell, 1949	
E. pseudorobusta, new species	*E. pseudorobusta,* new species

Euryte longicauda var. *minor* T. Scott, 1905a (p. 143, pl. 10, figs. 13, 14) really represents a variety of *E. longicauda,* generally found in deeper waters; its structural differences with the typical form are so insignificant that it certainly cannot be maintained at a specific level.

Males and females of *Euryte* can be distinguished with the following key:

1. Furcal rami 7–8 times as long as wide . . . . **E. longicauda** Philippi
   Furcal rami 2–4 times as long as wide 2
2. Furcal rami 3–4 times as long as wide 3
   Furcal rami twice as long as wide or shorter 5
3. Median apical spine on 3rd endopodal segment of leg 4 short and broadly ovate, shorter even than (compact) 3rd endopodal segment. All feet with short and broad segments; spines with broad lamellar edges, short. ♂ with short, thick, curved seta on the anterior aspect of thick, median (13th) antennular segment . . . . **E. robusta** Giesbrecht
   Median apical spine on 3rd endopodal segment of leg 4 longer than slender 3rd segment. Feet normally developed; spines with slender, elongated ovate, lamellar edges, ♂ unknown 4
4. Median apical spine on 3rd endopodal segment of leg 4, 1½ times as long as 3rd segment. Terminal segment of endopodite maxillipede short, claws on this segment short, of equal length . . . . . . **E. curticornis** G. O. Sars
   Median apical spine on 3rd endopodal segment of leg 4 only slightly longer than 3rd segment. Terminal claws on endopodite maxillipede unequal, terminal segment elongate . . . . **E. similis** T. Scott

5. Antennules 18-segmented . . . . **E. sewelli,** new species
Antennules 21-segmented 6
6. Median apical spine 3rd endopodal segment of leg 4, 1¼ times as long as 3rd endopodal segment. Cephalic somite short; antennules just reach end of cephalic somite . . . . **E. brevicauda** Sewell
Median apical spine of 3rd endopodal segment of leg 4, ¾ the length of the 3rd segment. Cephalic somite large, antennules scarcely reach beyond the middle of that somite . . . . **E. pseudorobusta,** new species

***Euryte pseudorobusta,* new species**

Figures 8–10

Material.—Loc. 589, 1 ad. ♀, 0.53 mm.; 1 ad. ♂, 0.53 mm.; 2 juv., 0.37 and 0.47 mm. (developmental stage unknown). Loc. 590, 2 ad. ♀♀, 0.53 and 0.60 mm.; 1 ad. ♂, 0.46 mm.; 2 ♀♀ cop. stage V, 0.48 and 0.51 mm. Loc. 591, 3 ad. ♀♀, 0.56, 0.60, and 0.65 mm.; 1 ad. ♂, 0.47 mm.

Description.—The following is based on the female of 0.65 mm. length from locality 591 (holotype) and on the male (allotype) from that locality. All remaining specimens are paratypes. The specimens described have been dissected and their appendages mounted.

Adult female, total length 0.65 mm. (0.53–0.65 mm.). Proportional length of cephalothorax and abdomen is 11:9. Greatest diameter 0.23 mm.; length of longest furcal seta 0.20 mm.

Gracefully built species, with slender, elongated, ovate cephalothorax and distinctly set off, slender abdomen (figs. 8*a*,*b*). Cephalothorax distinctly compressed dorsoventrally; head and 1st thoracic somite completely fused to form cephalic somite, which takes considerable part of cephalothorax. Cephalic somite dorsally with broadly rounded anterior portion, slightly narrowed between insertion of antennules, base of rostrum again broadly rounded. In lateral aspect back almost straight, anteriorly broadly rounded and curving almost imperceptibly into rostral plate. Rostrum attached with broad base, invisible from above, pointing downward and slightly backward, triangular, apex rounded. 2nd and 3rd thoracic somites of about same length; 4th thoracic somite notably small, in dorsal view cut off almost squarely, in lateral view rounded. The various parts of the cephalothorax have the following proportional lengths:

somite	head+1	2	3	4
	70	11	13	6=100.

5th thoracic somite small, laterally produced into pointed, wing-shaped expansions; points directed laterally and slightly backward. Genital somite composed of fused abdominal somites 1 and 2, line of fusion visible on back and partly on sides. In dorsal view genital somite appears to be produced into number of tubercles (fig. 8*a*). Distal

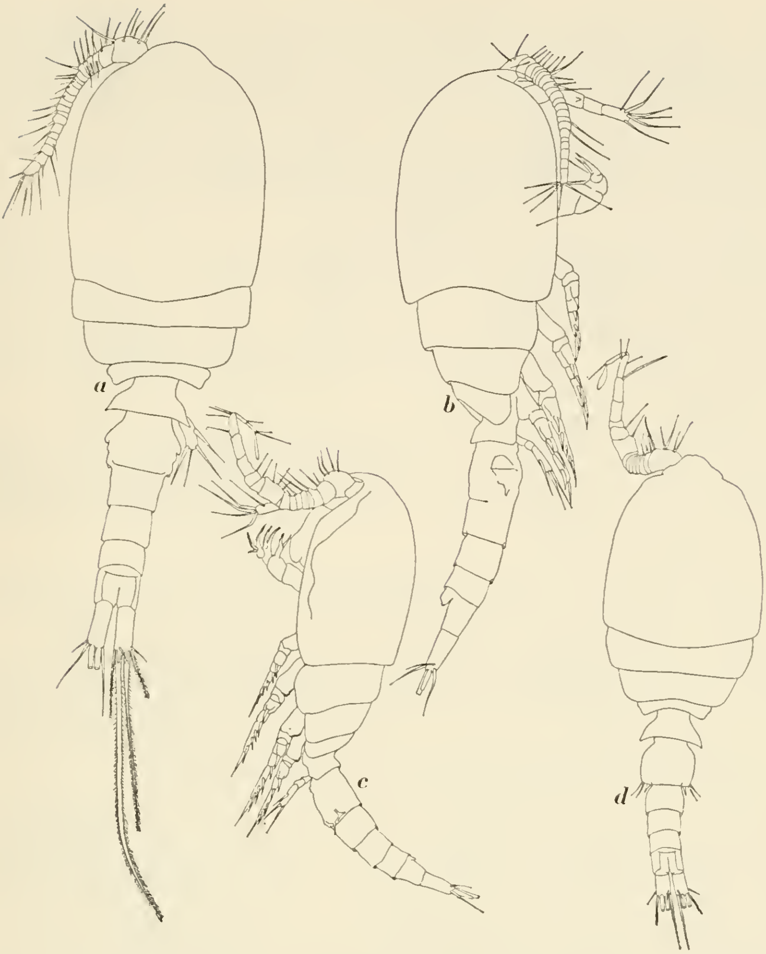


Figure 8.—*Euryte pseudorobusta*, new species, loc. 591, ad. ♀, holotype: *a*, dorsal view; *b*, same animal, lateral view from right side; ad. ♂, allotype: *c*, lateral view from left side; *d*, same animal, dorsal view. (× 125.)

swelling on each side provided with small, bluntly pointed process, directed backward and especially visible from below (fig. 10*b*). All abdominal somites are nude; they have, with the furca, the following proportional lengths:

somite	5	1+2	3	4	5	furca	
	15	35	14	8	13	15	=100.

Anal somite as long as furca, anal flap broadly rounded, placed proximally. Furcal rami parallel, nearly twice as long as wide (proportions 11:6), nude, cylindrical, each ramus with 5 marginal setae and 1 appendicular seta. Setae 1 and 4 small, plumose, placed at end of internal and external margins. External seta (5) very small, nude, and placed almost at end of external margin. Setae 2 and 3 lengthened and thickened, especially 2nd, apices curving outward. Both setae are strongly setose. Appendicular seta very small.

Antennules short, 21-segmented, reaching half length of cephalic somite; setation represented in figure 9*a*.

Antenna (fig. 9*b*) composed of coxa, basis, and 2-segmented endopodite; exopodite fully absent. Coxa with 2 setae at end of internal and external margin; basis with single seta. 1st endopodal segment with 1+3 setae. Terminal (2nd) endopodal segment with 6 geniculate setae and 1 appendicular seta.

Mandible (fig. 9*c*) with much reduced palp, represented by knob-shaped projection, bearing 2 long setae (third seta must have been removed during preparation). Cutting edge of mandibular praecoxa with 10 sharp teeth of variable size and a small, fine seta at base of row of teeth (fig. 9*d*).

Maxillule (fig. 9*e*) with greatly developed praecoxal arthrite, bearing 5 strong, short teeth and 2 haired setae. Remainder of maxillule (basis, coxa, endopodite, and exopodite) represented by process with denticulated margin and articulating with arthrite, carrying two setae. I cannot homologize these structures with the parts of a normally developed maxillule because of the extreme degree of reduction and the absence of intermediary species.

Maxilla (fig. 9*f*) strongly developed. Praecoxa with rounded, low endite, carrying a fine seta. Coxal endite large, with 2 spines, one of which is coalescent with endite. Basis distinctly articulating with the coxa, carrying 2 spines and 1 seta. Endopodite small, 1-segmented, with 4 spiniform setae.

Maxillipede (fig. 9*g*) small, coxa and basis of same length; coxa with 2 setae, each placed on small lobe. Basis strongly swollen internally and with single fine, long seta. Endopodite apparently 3-segmented, but articulation, especially between segments 2 and 3, obscure. 1st segment small, segment 2 styliform, 3 times as long as wide, with single seta. Apical segment with 2 claw-shaped spines of unequal size.

Legs 1–4 (figs. 10*a–d*) practically identical with those of *Euryte robusta* Giesbrecht, as described by Sars (1913, pl. 13) and Sewell (1949, p. 31, fig. 2), especially with regard to length of spines and spiniform setae on endopodites, and in this respect very different from *E. longicauda* Philippi, *E. similis* T. Scott, *E. curticornis* G. O. Sars, and *E. brevicauda* Sewell. On the legs there are two types of spines, viz., spines with a broad, ovate, serrated lamella,

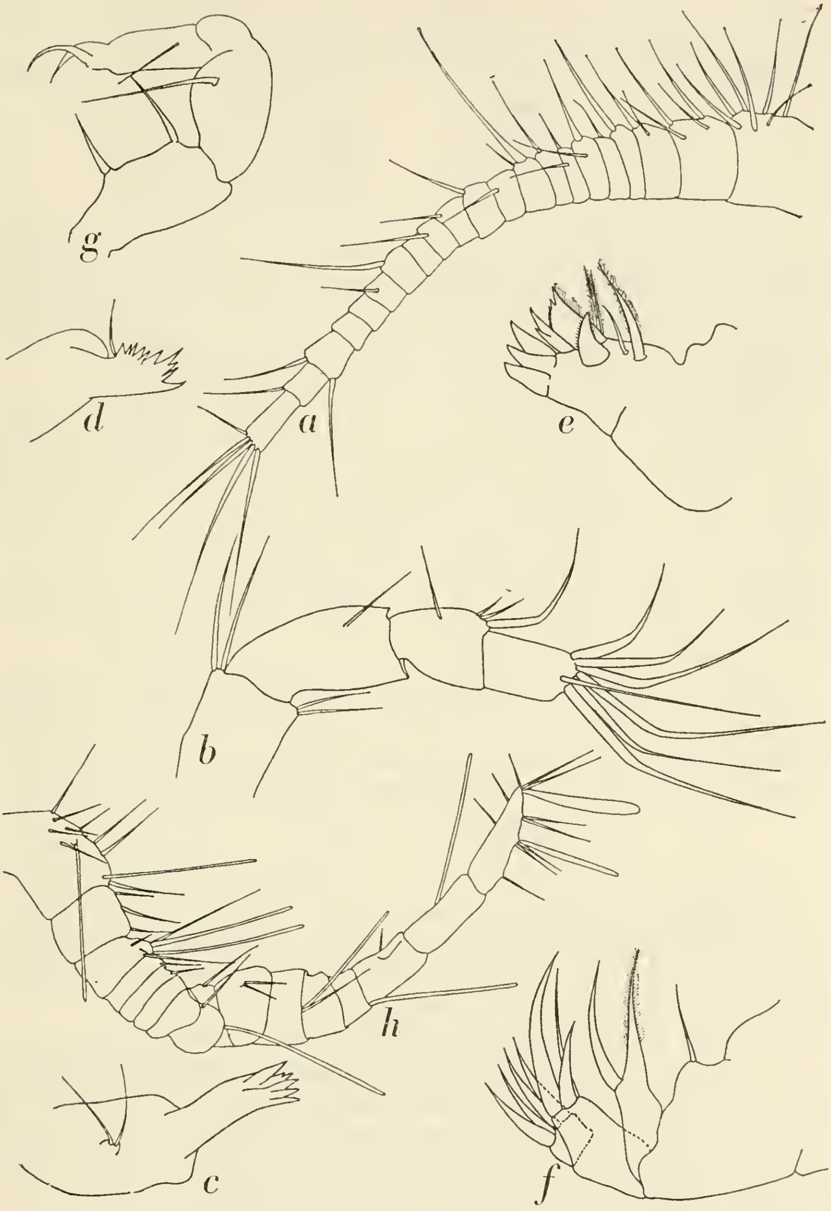


Figure 9.—*Euryte pseudorobusta,* new species, loc. 591, ad. ♀, holotype: *a,* antennule; *b,* antenna; *c,* mandible; *d,* cutting edge of mandibular praecoxa; *e,* maxillule; *f,* maxilla; *g,* maxillipede; loc. 591, ad. ♂, allotype: *h,* antennule. (× 460.)

which form the only spines on the exopodites; on the endopodites these are mixed with long and slender spines, with a smooth, thin lamella. External and apical spines of the endopodite, of the first type; those along the internal border, of the second type.

Setal and spinal formula (former in arabic, latter in roman numerals):

	endopodite	*exopodite*
leg 1	1.2.III II I	1 (+I).1 (+I).4 I III
leg 2	1.2.III II I	1 (+I).1 (+I).V I III
leg 3	1.2.III II I	1 (+I).1 (+I).V I III
leg 4	1.II. II II I	1 (+I).1 (+I).V I III

There is a small mistake in Sewell's table of setation in *E. robusta* (1949, p. 33): the number of spines on the 3rd endopodal segment of leg 3 is VI and not XI as Sewell's table indicates. Moreover, there are 2 spines at the internal margin of the 2nd endopodal segment of leg 4 and not 2 setae as Sewell's table seems to suggest.

Strong spine at the internal corner of the basis of leg 1. Spines on 3rd endopodal segment of legs 1–3 remarkably short, especially those of internal margin. On corresponding endopodal segment of leg 4, spines slightly longer; median apical spine of this segment shorter than the segment (proportion 3:4).

Leg 5 as in *E. robusta,* apical segment 3 times as long as the greatest diameter, with 3 spines and 1 seta. The lengths of the spines can best be judged from figure 10*e*.

Color faded, whitish. No pigmented spot or eye visible.

Adult male, total length 0.47 mm. (0.46–0.53 mm.). Greatest diameter 0.17 mm.; length longest furcal seta 0.65 mm.

General shape of body as in female (figs. 8*c*,*d*). The various parts of the cephalothorax have the following proportional lengths:

somite	head+1	2	3	4
	67	13	13	7=100.

Cephalothorax slenderer than in female; anterior part of head developed very differently, as appears from comparison of figures 8*a* and 8*d*. Rostrum, as in female, invisible from above; it is a triangular, slightly curved plate with rounded apex.

Abdomen 6-segmented, 5th thoracic somite developed as in the female, 1st and 2nd abdominal somites separate. No lateral swellings on genital somite; genital plates caudally produced into spine. In addition there are two haired setae on each plate (fig. 10*g*). Setae 2 and 3 of furcal rami slightly stronger and notably longer than in female, especially 2nd, which surpasses total length of body.

Antennules with reduced number of segments (15), both chelate, directed forward, last 2 segments on each side forming movable part. The hinge, consequently, is developed between segments 13 and 14. Setation and development of aesthetascs represented in figure 9*h*; aesthetascs on ultimate segment are notably strong, especially distal aethetasc, which is club-shaped.

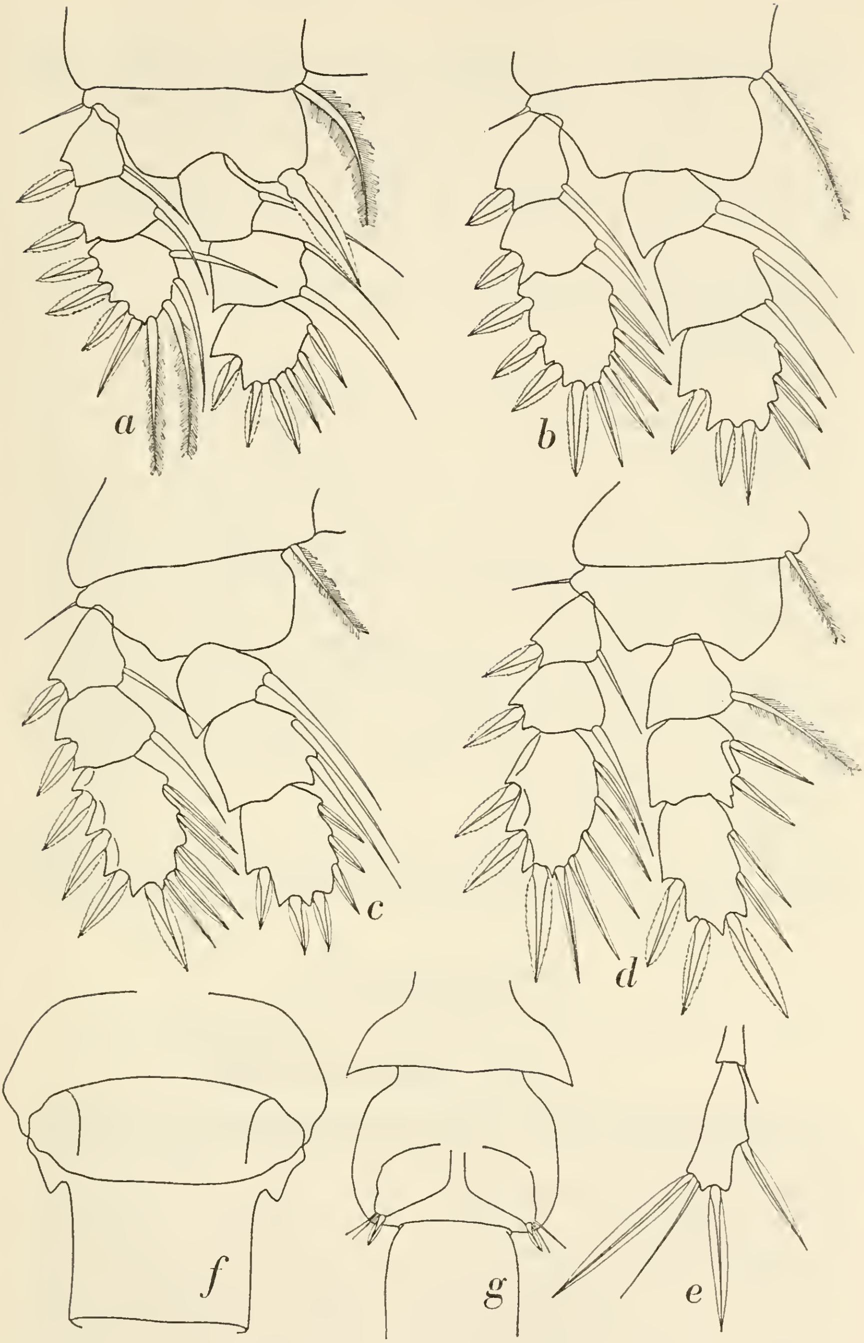


Figure 10.—*Euryte pseudorobusta*, new species, loc. 591, ad. ♀, holotype: *a*, leg 1; *b*, leg 2; *c*, leg 3; *d*, leg 4; *e*, leg 5; *f*, genital somite, ventral view; ad. ♂, allotype: *g*, genital somite, ventral view. (× 460.)

I failed to observe differences in the structure of antennae, oral parts, and legs; they are, however, slightly smaller than those of the female. Mandibular praecoxa in my preparation of the male was in a favorable position and consequently it has been figured (fig. 9*d*).

REMARKS.—The present new form is more or less intermediate between *E. robusta* Giesbrecht and *E. brevicauda* Sewell, at least as far as the female is concerned, the male of *E. brevicauda* being unknown. It shows, in the structure of the appendages, complete conformity with *E. robusta* and in size it approaches very closely the specimens of that form described by Sewell (1949). It is, however, at once differentiated by the much shorter furcal rami (nearly twice as long as broad and as long as the anal somite in *E. pseudorobusta;* 4 times as long as wide and as long as abdominal somites 4+5 in *E. robusta*), in which character it closely approaches *E. brevicauda.* In this species, however, the spines on the endopodite of the legs are of the long and slender type. The short furcal rami occur in all specimens under observation and in all cases are coupled with short spines on the endopodites; I have therefore been forced to describe the species under a new trivial name. In the shape of the cephalothorax too the present form appears to differ from *E. brevicauda*, as a comparison between Sewell's figure 3a and my drawings of the whole animal clearly shows. The form of the cephalothorax of *E. pseudorobusta* approaches the type of body found in *E. sewelli* (Sewell, 1949, p. 35, fig. 4, as *Euryte* spec.), but in that species the antennules are 18-segmented.

Euryte pseudorobusta is probably a strict sand-dweller, inhabiting interstitial water in the sandy beaches of Ifaluk; it occurred exclusively in sand samples taken at various distances from the reef margin.

Suborder Poecilostoma

Family Lichomolgidae G. O. Sars, 1917

Genus *Macrocheiron* Brady, 1872

I have used this genus in the restricted sense defined by Stock (1957), including only the species *Macrocheiron fucicolum* Brady, 1872, *Pseudanthessius chelifer* Thompson and A. Scott, 1903, and *Macrocheiron mutatum* Stock, 1957. It seems to me that Stock's conclusion concerning the correct spelling of the generic name is not fully justified. The relevant page of Follett's paper (p. 66) to which Stock refers contains a recommendation for transliteration of Greek words when composing a new generic or trivial name. In the present case there is more than one original spelling (*Macrochiron* used in the text of Brady's 1872 paper and *Macrocheiron* used in the plates of that paper), while the name *Macrocheiron* is used in the first subsequent publication

(Brady's 1872a paper, which, as Stock showed, must have been published after his 1872 paper). It seems to be indicated, therefore, that we use the name *Macrocheiron* Brady, 1872.

The three species referable to the genus can be separated with the following key:

1. Endopodite of leg 4, 1-segmented . . **M. cheliferum** (Thompson and A. Scott)
   Endopodite of leg 4, 2-segmented 2
2. 3rd exopodal segment of leg 4 with 3 spines along external margin. **M. mutatum** Stock
   3rd exopodal segment of leg 4 with 2 spines along external margin. **M. fucicolum** Brady

Macrocheiron fucicolum Brady, 1872

Macrocheiron fucicolum Brady, 1872, text on pl. 3; 1872a, p. 434, pl. 18 (figs. 9–18).

? *Macrocheiron fucicolum.*—Vàtova, 1928, p. 179.—Marine Biological Association, 1931, p. 171.—C. B. Wilson, 1932, p. 349, fig. 209.—Gallingani, 1952, p. 75; Marine Biological Association, 1957, p. 176.

Macrochiron fucicolum.—Brady, 1872, p. 9, pl. 3 (figs. 9–18).—Stock, 1957, pp. 379, 380, figs. 1–10.—Stock and de Vos, 1960, p. 206.

Macrochiron (*Paramacrochiron*) *fucicola.*—Sewell, 1949, pp. 94, 95, 99, 108, 152, 156, 158, 185, 186, 187.

Lichomolgus fucicolus.—Brady, 1880a, p. 41, pl. 85 (figs. 1–11); 1902, p. 55.—T. Scott, 1912, p. 571, pl. 12 (figs. 22–26).

?*Lichomolgus fucicolus.*—Brady and Robertson, 1873, p. 140; 1876, p. 197.—Thompson, 1889, p. 189; 1893, p. 207, pl. 25 (fig. 1).—T. Scott, 1894a, pp. 233, 258.—Thompson, 1897, p. 98.—T. Scott, 1901, p. 252; 1905a, tab. 2.—Conseil l'exploration mer, 1906, p. 75.—Pearson, 1906, p. 22.—Sharpe, 1910, pp. 408, 422, fig. 16.

Macrocheiron mutatum Stock, 1957

Macrocheiron fucicolum G. O. Sars, 1917, p. 163, pl. 91.

Macrochiron mutatum Stock, 1957, pp. 379, 381.

Macrocheiron cheliferum (Thompson and A. Scott, 1903)

FIGURES 11*a*, 12–14

Pseudanthessius chelifer Thompson and A. Scott, 1903, p. 277, pl. 14 (figs. 12–18).—Steuer, 1940a, p. 20.—Tanaka, 1960, p. 77.

Macrocheiron chelifer.—Gurney, 1927, p. 469, fig. 114.

Lichomolgus (*Macrochiron*) *chelifer.*—Monod and Dollfus, 1932, p. 139.

Macrochiron (*Paramacrochiron*) *chelifer.*—Sewell, 1949, pp. 99, 108, 168, 177, 178.

Macrochiron cheliferum.—Stock, 1957, pp. 379, 381.

MATERIAL.—Loc. 756, 7 ad. ♀♀, 0.84–0.90 mm. (0.87 mm.), 2 ad. ♂♂, 0.77 and 0.90 mm.

DESCRIPTION.—The following is based on a female specimen of 0.87 mm. length and a male of 0.90 mm. length. Both have been dissected and the appendages mounted on slides.

Adult female, total length 0.87 mm.; greatest diameter 0.35 mm.; length of longest furcal seta 0.23 mm.

Body cyclopiform (figs. 11*a*, 12*a*), cephalothorax ovoid, abdomen slender, proportional lengths 33:24. Head and 1st thoracic somite completely fused to form cephalic somite and occupying considerable part of cephalothorax. Cephalic somite considerably flattened dorsoventrally, in lateral aspect with smoothly curved back (fig. 11*a*). Head broadly rounded in lateral view, curved imperceptibly into rostral plate. Lateral parts of cephalic somite slightly but distinctly produced to shield oral appendages. Posterolateral corners of cephalic somite slightly produced and rounded. In dorsal aspect frontal part of cephalic somite broadly and uniformly rounded, outline of head forming almost complete semicircle, greatest diameter behind middle. Rostrum not visible from above or from side; appears in ventral aspect as backward directed plate, broadly triangular, between basal portions of antennules. Apex of rostral plate produced into single fine filament (fig. 12*f*).

Body between thoracic somites contracted, with the result that somites stand out very clearly; contraction deepest between somites 3 and 4. Thoracic somites 2 and 3 have about same length, 4th thoracic somite being much smaller. Lateral borders of somites 2 and 3 cut off almost squarely in dorsal and lateral aspect; lateral borders of somite 4 in dorsal view rounded, in lateral aspect slightly produced backward and rounded.

5th thoracic somite as broad as 4th but distinctly longer; insertion of feet laterodorsally, with the result that 5th legs point obliquely upward. Genital somite slightly shorter than combined length of abdominal somites 3 to 5, composed of fused somites 1 and 2. In dorsal aspect (fig. 12*b*) it has a curious top-shaped appearance by the presence of a lateral swelling on each side, each swelling being obtusely pointed. Genital apertures laterally closed by plates that are distinctly visible in lateral aspect of somite, slits continuing dorsally as shallow ridges (fig. 12*c*). There is another pair of ridges on the distal part of the genital somite representing the lines of fusion between abdominal somites 1 and 2; these run from mediocaudally to lateroventrally. No dorsal or ventral swellings on genital somite (figs. 12*b*, *c*). Abdominal somites 3 and 4 and anal somite of nearly same length, anal somite with small, proximally placed operculum. No spinules or hairs along distal portions of abdominal somites.

Furcal rami nearly 3 times as long as broad (proportion 8:3), each ramus with 5 marginal setae. Setae 1, 4, and 5 are only slightly longer than furca, seta 5 inserting subapically. Setae 2 and 3 elongated and slightly thickened; they reach ⅔ length of abdomen. This female specimen carries two elongated, oval sacs, attached laterally, containing numerous small eggs.

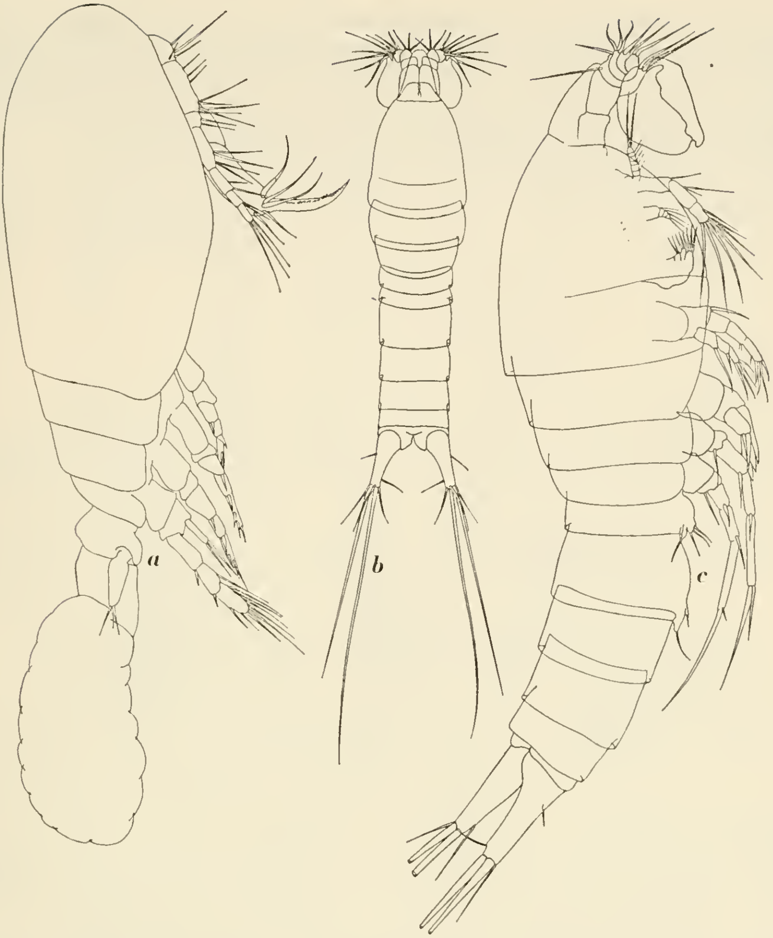


FIGURE 11.—*Macrocheiron cheliferum* (Thompson and A. Scott), loc. 756, ad. ♀: *a*, whole animal, lateral view from right side. *Ifanella chacei*, new species, loc. 81–A–3–d, ad. ♂, holotype: *b*, whole animal, dorsal view; *c*, same animal, lateral view from right side. (*a*, *c*, × 125; *b*, × 65.)

Antennules 7-segmented, 3rd segment very small. Setation represented in figure 13*a*; there is one aesthetase on the last (7th) segment.

Antenna (fig. 12*g*) at once remarkable by strong development of apical claws. Coxa and basis small, former asetosa, latter with very strong spine near internal apex. Endopodite either 1- or 2-segmented. There are 6 setae (some of which are spiniform) and 2 strong claws. 5 setae and the bigger claw may be placed on a small apical endopodal segment, of which the jointing with the 1st segment is very indistinct. Proximal claw slender, internal margin finely denticulated along entire length. Apical claw very strongly developed; the apical part, set off from the rest of the claw, with fine denticules along inner edge; inner edge of the rest of the claw with strong, plate-shaped teeth, gradually decreasing in size basally. The structure of the antenna, as described here, differs in some respects from that in Thompson and A. Scott's description and from Gurney's drawing (1927, fig. 114a).

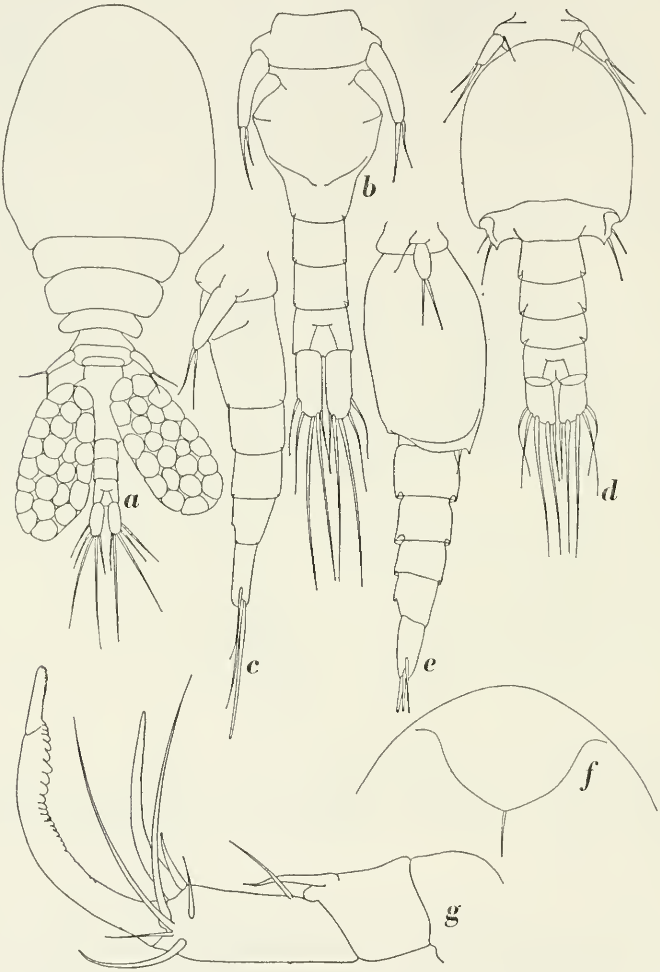


FIGURE 12.—*Macrocheiron cheliferum* (Thompson and A. Scott), loc. 756, ad. ♀: *a*, whole animal, dorsal view; *b*, abdomen, dorsal view; *c*, abdomen, lateral view from right side; *f*, rostrum, ventral view; *g*, antenna; ad. ♂: *d*, abdomen, ventral view; *e*, abdomen, lateral view from right side. (*a*, × 80; *b–f*, × 150; *g*, 250.)

Mouth parts of female described and figured by Thompson and A. Scott (1903) and not described in detail here. Maxillule has been figured by these authors as mandibular palp. Maxillipede (fig. 13*b*)

2-segmented, with strongly haired seta at base of basal segment (presumably coxa) and 3-terminal, claw-shaped setae at end of apical segment.

Legs 1 to 3 with 3-segmented endopodites and exopodites; leg 4 with transversally elongated coxa and basis, and 3-segmented exopodite and 1-segmented endopodite. The various particulars of the legs appear from the setal formula, figures 14*a–d*, and the following notes. Setal formula:

	endopodite	*exopodite*
leg 1	1.1.321	0.1.323
leg 2	1.2.321	0.1.423
leg 3	1.2.221	0.1.423
leg 4	2	0.1.422

Leg 4 (fig. 14*d*) with styliform endopodite, 1-segmented, with 2 unequal spiniform setae. 3rd exopodal segment with 2 spines along the external margin.

Leg 5 (fig. 13*c*) styliform, 1-segmented, gradually tapering towards the apex and there with 2 setae, one of which is thickened, about ¾ the length of the 5th leg.

Color a light horny yellow. No eye visible.

Adult male, total length 0.90 mm.; greatest diameter 0.33 mm.

The adult male resembles the adult female in many respects; a complete description, therefore, is unnecessary. Cephalothorax, in two males present, trifle slenderer and less broadly rounded, with indication of being squarish. Rostrum as in female.

Abdomen 6-segmented; genital somite large and swollen, slightly longer than broad (proportion 13:11), swollen laterally and with indication of ventral swelling. Shape can best be judged from figures 12*d*,*e*; genital apertures closed, ventrally, by 2 huge plates, each drawn out laterally into short, strong point, preceded by two fine setae at external border. Abdominal somites 2 and 3 of same length; 4 and 5 also of same length, each slightly shorter than 2nd or 3rd. Anal somite and furca as in female.

Antennules as in female, one of setae on 2nd, 3rd, and 4th segments modified to form aesthetasc, bringing total number of aesthetascs on male antennule to 4.

Antenna and mouth parts as in female, with exception of maxillipeds. These, in the male, are chelate and powerfully developed. Coxa short, asetose; basis big and swollen, with an internal, longitudinal row of strong, blunt teeth. Endopodite long and slender, longer than basis and slightly curved, forming well-developed, slender digit, with fine seta at its base and spoon-shaped, dilated part at apex (fig. 13*d*).

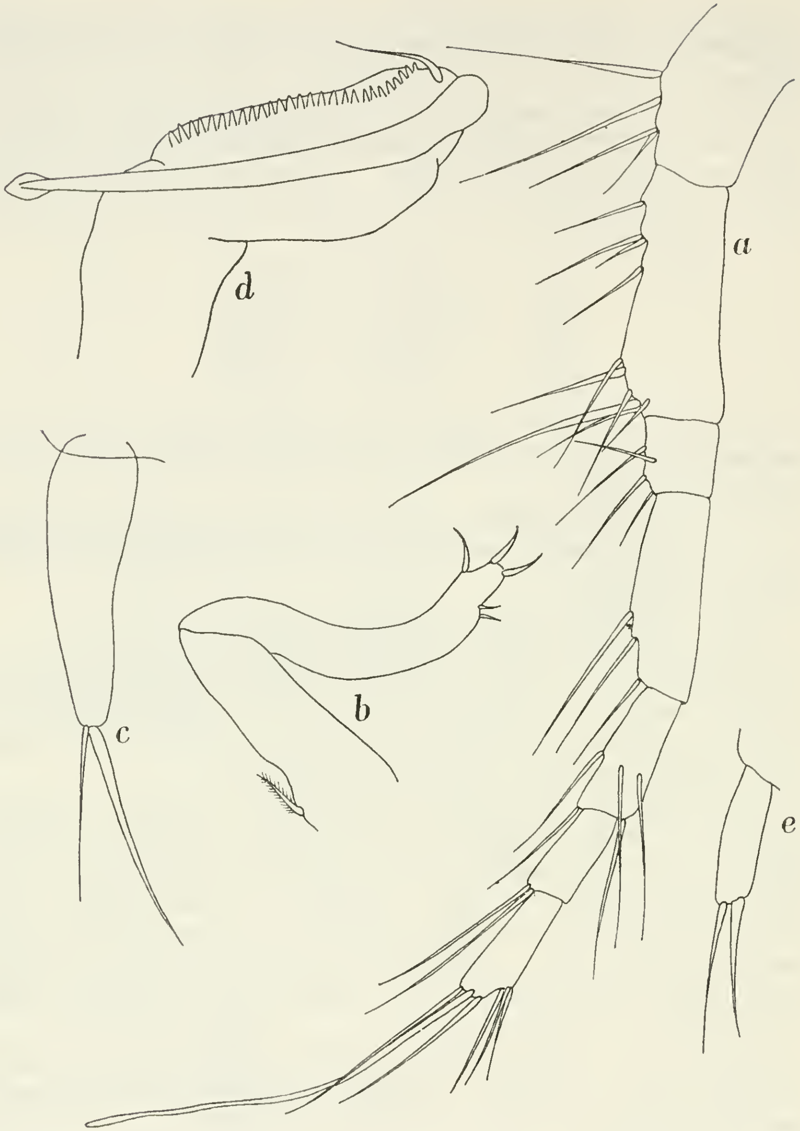


Figure 13.—*Macrocheiron cheliferum* (Thompson and A. Scott), loc. 756, ad. ♀: *a*, antennule; *b*, maxillipede; *c*, leg 5; ad. ♂: *d*, maxillipede; *e*, leg 5. (× 510.)

Legs 1 to 4 as in female: 3rd endopodal segment of 2nd pair with short, thick spines. Leg 5 smaller than in female, about half as long, with 2 setae, one of which, as in female, is thickened (fig. 13*e*).

Remarks.—*Macrocheiron cheliferum* is a very rare species. It was based originally on some female specimens (accurate number not given) found in washings of invertebrates and debris from the Ceylon

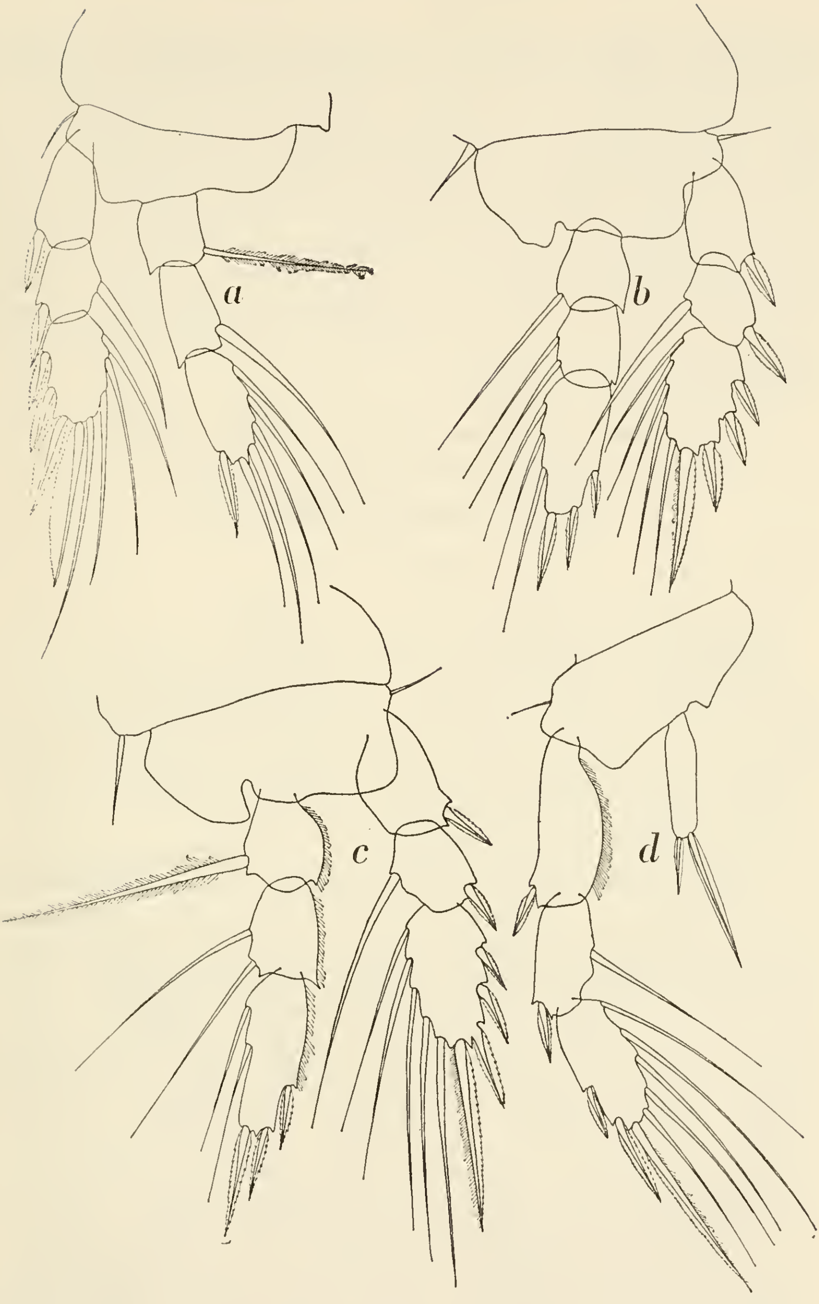


Figure 14.—*Macrocheiron cheliferum* (Thompson and A. Scott), loc. 756, ad. ♀: *a*, leg 1; *b*, leg 2; *c*, leg 3; *d*, leg 4. (× 460.)

pearl oyster banks in the Gulf of Mannar (Thompson and A. Scott, 1903; length of ad. ♀ 1 mm.). A single male specimen was recorded by Gurney (1927) from the Gulf of Suez; the specimen measured 1.0 mm; the conditions under which the specimen was obtained are not given in Gurney's paper. The present record seems to suggest that the species is more widely distributed in the Pacific area and apparently lives on hydroids, from which the specimens apparently were removed. [The number given in the tube, 756, refers to hydroids taken from the ship's passage, Ifaluk Atoll, 5–5.5 fms. depth, Oct. 28th, 1953. There are no further indications on the label; the specimens apparently either were found in the collecting jar after removal of the hydroid or were washed from the hydroid.]

Family Bomolochidae C. B. Wilson, 1911

Genus *Bomolochus* Nordmann, 1832

Bomolochus leptoscari Yamaguti, 1953

FIGURES 15, 16

Bomolochus leptoscari Yamaguti, 1953, p. 222, pl. 1 (figs. 9–11), pl. 2 (figs. 12–18).

MATERIAL.—Harry Sta. 41, 1 ad. ♀, 1.05 mm.

DESCRIPTION.—The following is based on the only female specimen, which has been partly dissected. The appendages of the left side have been removed, during which operation the body was slightly damaged. Appendages and the rest of the female have been mounted.

Adult female, total length 1.05 mm., greatest diameter 0.50 mm.; length of longest furcal seta 0.30 mm.

General shape of body elongated ovate, differing from type usually met with in *Bomolochus* by great development of cephalothorax, of which, in region of cephalic somite, 2nd and 3rd thoracic somite diminished very little in width (fig. 15*a*). Adbomen short and small; separation indistinct because of small, 4th, thoracic somite. Head and 1st thoracic somite completely fused, no line of separation visible, distinctly wider than long (proportion 4:3), as long as combined length of thoracic somites 2 and 3. Cephalic somite (and thoracic somites 2 and 3) strongly compressed dorsoventrally. Cephalic somite anteriorly almost semicircular, caudally cut off squarely; frontal part of head leaves basal parts of antennules free: between these basal parts base of rostral plate distinctly visible as produced part, well separated from cephalic somite by shallow groove (fig. 15*c*). There is a narrow, hyaline band along the lateral parts of the cephalothorax, first visible where the antennules become free, and continuing for some distance caudally. Hyaline lamella visible in both dorsal and lateral aspects. Ventral wall of cephalic somite flattened laterally and in frontal part fused to antennular bases (segments 1 and 2), antennular segment 3 small and apparently free and partly visible from above. Between the basal antennular parts there is a distinct, bifid rostrum; the points curve outward and are strongly chitinized (fig. 15*d*). There is the indication of a rudimentary maxillary hook: the flattened edge of the cephalic somite shows a small tooth at the level of the fusion between antennular segments 1 and 2 (fig. 15*d*). 2nd thoracic somite as broad as cephalic somite, ⅓ as long, laterally cut off almost squarely. 3rd thoracic somite only slightly narrower than 2nd, though slightly longer. Laterally it is rounded. 4th thoracic somite small, half as broad as, and ⅓ the length of, the 3rd, with rounded, scarcely produced sides.

5th thoracic somite of characteristic, trapezoid appearance, maximal diameter surpassing that of 4th thoracic somite, curious shape apparently resulting from fusion of basal segment of leg 5 with somite (fig. 15*b*). I failed to observe a line of separation between these two parts, and the fine seta, which usually occurs on the basal segment, is found here at the extreme external margin of the somite, near the insertion of the 5th leg. The "shoulder" of the somite is set with scale-shaped teeth.

Genital somite resulting from fusion of abdominal somites 1 and 2, slightly shorter than 5th thoracic somite, distinctly produced laterally. The genital apertures are placed in the caudal wall of each swelling; the genital plates are not visible from above and they are bordered by 3 nude setae each; one of these setae is lengthened. On the left side of the genital somite a remnant of an egg sac is attached (figs. 15*a,b*).

Remaining abdominal somites gradually tapering, 3rd and 4th of same length, half as long as genital somite. Anal somite 1½ times as long as somites 3 or 4, with a small, broadly rounded anal flap (fig. 15*b*).

Furcal rami parallel, slightly asymmetrical, that on left side being slightly larger. They taper slightly near the apex and are about 1½ times as long as the basal diameter. Each ramus has 5 marginal setae and 1 appendicular seta. Setae 3, 4, 5, and appendicular seta short and fine, seta 2 on each side lengthened and thickened, reaching the length of the abdomen. Seta 5 inserts halfway along the external margin; the appendicular seta is placed on a slightly raised socle; its place can best be judged from figure 15*b*. Seta 1 is very small, placed at the end of the internal margin, scarcely observable. There are no spines, hairs, or teeth along the distal edges of the abdominal somites.

Antennules 6-segmented, composed of 3-segmented basal part, with indistinctly developed joints and more or less fused to ventral wall of cephalic somite, and free 3-segmented portion. Total length of antennules ⅔ length of cephalic somite. Setation represented in

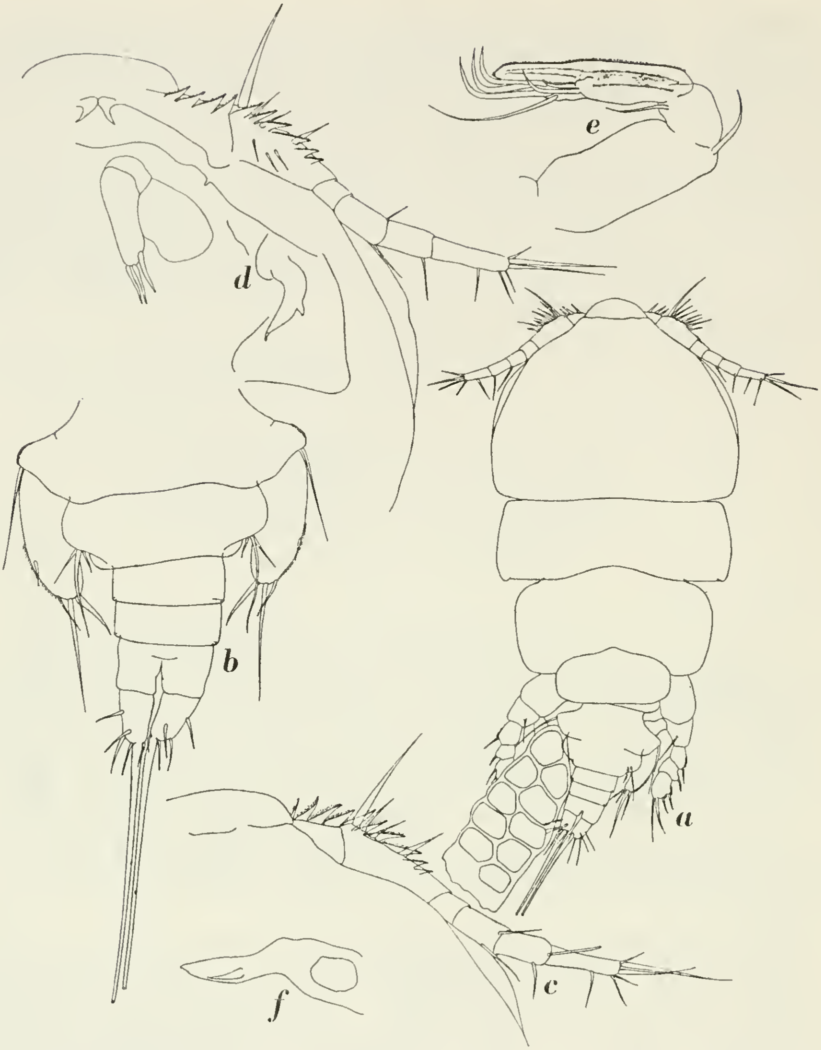


FIGURE 15.—*Bomolochus leptoscari* Yamaguti, Harry Sta. 41, ad. ♀: *a*, whole animal, dorsal view; *b*, 5th thoracic somite and abdomen, dorsal view; *c*, right part of cephalic somite, dorsal view; *d*, left part of cephalic somite, ventral view; *e*, antenna; *f*, mandible. (*a*, × 62; *b–d*, × 165; *e*, *f*, × 275.)

figures 15*c*,*d*. In addition to the setae there are a number of conical, thick, strongly haired sensory appendages on segments 1 and 2.

Antenna (fig. 15*e*) 4-segmented, composed of outwardly directed coxa, while basis and endopodal segments 1 and 2 curve inward over coxa, with the result that their apices are close to oral aperture. Coxa cylindrical, elongated, with single seta near insertion of basis. Basis small, with single seta. Segments 1 and 2 of endopodite weakly separated, with number of longitudinal ridges of small scales or spinules; those along frontal border better developed, pectiniform. Near the end of the 1st endopodal segment a strong curved seta and a short process with a pectiniform row of hairs insert; near the (indistinct) articulation with the 2nd segment there are 3 more hooked spines and a seta. Labrum a broad, bilobated structure in front of the mouth parts, densely covered with short hairs (fig. 16*e*).

Mandible (fig. 15*f*) with distinct, well-developed, internally directed praecoxal process, forming sharp manducatory plate, edge of which indistinctly denticulate. This manducatory plate has either a short seta or a small tooth, closely pressed against the plate. I failed to observe a palp. Immediately caudally of the manducatory processes there is a pair of haired paragnaths, at the base of which, wedged between the basal portions of mandible and maxilla, is a small, rounded structure, the maxillule, fused to the oral field and bearing 3 short setae (fig. 16*e*). Maxilla medially produced into 2 haired processes, representing teeth or setae supported by one of endites (fig. 16*f*). In addition, there appears to be a fine seta at the base of the teeth. The labium was damaged during dissection, with the result that I could not observe the structure.

Maxillipedes particularly big and very prominent structures of ventral aspect of cephalic somite (fig. 16*g*). Coxa small, attached close to median line, turned outside, strongly attached to ventral wall of cephalic somite. Basis large, elongated triangular, length axis in longitudinal direction, with the result that articulation between basis and endopodite lies near point of attachment of antennae and is hidden under curved edge of cephalic somite. Endopodite strongly reduced to form highly chitinized, sigmoid claw with external auxiliary tooth. There is a fine seta on the claw near its insertion and a plumose seta on the basis just visible in the curve of the claw.

Leg 1 (fig. 16*a*) strongly flattened, coxa and basis fused, without marginal spines or setae. Exopodite indistinctly 3-segmented, endopodite distinctly 3-segmented. Apical exopodal segment with 6, big, densely plumose, marginal setae and 2 external marginal spines; exopodal segments 1 and 2 each have 1 external marginal spine. Endopodal segments 1 and 2 each with strong internal seta; there are no external setae on these segments. The 3rd endopodal segment has a total of 5 plumose setae.

Legs 2 to 4 (figs. 16*b*–*d*) with transversally elongated and directed coxae and short bases. Coxae strongly swollen; bases also swollen, with single seta placed on caudal surface of segment near insertion of exopodite; in my dissections this seta is usually curved between endopodites and exopodites. Endopodites and exopodites 3-seg-

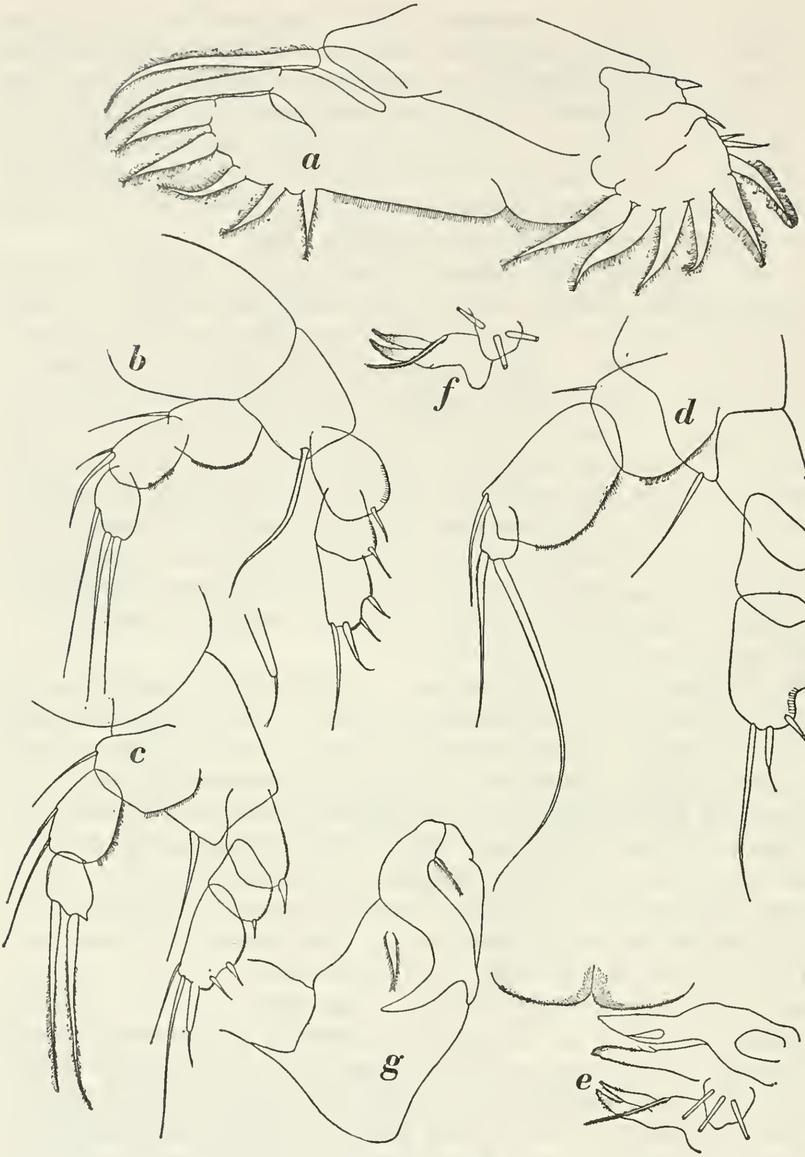


FIGURE 16.—*Bomolochus leptoscari* Yamaguti, Harry Sta. 41, ad. ♀: *a*, leg 1; *b*, leg 2; *c*, leg 3; *d*, leg 4; *e*, oral parts, left side, showing the mandible, paragnaths, maxillule and maxilla; *f*, maxillule and maxilla; *g*, maxillipede. (× 305.)

mented. As appears from the setal formula, the number of spines and setae is reduced. External margins of exopodal segments with scale-shaped teeth, giving segments curious, roughened appearance. 3rd (apical) external marginal spine of 3rd exopodal segments conical, with a fine seta at apex. Internal surfaces of 1st and 2nd endopodal segments haired. 3rd endopodal segment of leg 4 small; setae, especially the internal, greatly lengthened.

The various particulars of the legs follow from figures 16*a–d* and the setal formula:

	endopodite	*exopodite*
leg 1	1.1.5	0.0.6. 2
leg 2	1.2.120	0.0.013
leg 3	1.2.020	0.0.113
leg 4	1.1.020	0.0.013

Leg 5 (fig. 15*b*) apparently 1-segmented, but basal segment fused to 5th thoracic somite, which bears fine, external seta near insertion of free segment. "Shoulder" set with fine, scale-shaped teeth. Free segment flattened, 3 times as long as broad, slightly reniform, external margin shortly haired, at about ⅔ length from apex with fine seta. Apex set with 3 setae of unequal length, median seta greatly lengthened. Internal (concave) margin of free segment nude.

Color deep yellowish-brown.

Remarks.—In spite of certain differences in setation, I have identified the Ifaluk specimen with a *Bomolochus* described from Japan and taken from a species of fish, *Leptoscarus japonicus* (Cuvier and Valencienne), which apparently does not occur in the region of the Marshall Islands. I have based this apparently curious conclusion on the following considerations.

Bomolochus leptoscari Yamaguti, as appears at once from Yamaguti's figure (1953, pl. 1, fig. 9), with regard to the general pattern of the body, occupies a more or less isolated position in the genus. The cephalothorax is very large and formed by the head and somites 1 to 3, which all have about the same width; the abdomen is notably short. There is complete conformity in the structure and setation of antennules, antennae, and oral parts. The very characteristic structure of leg 1 is identical in both forms. The differences in setation are restricted to the following points:

Leg 2. 2 internal setae occur on the 2nd endopodal segment in the Ifaluk specimen that are not figured by Yamaguti (pl. 2, fig. 15), but in his drawing of that leg there is one additional internal seta on the 3rd exopodal segment.

Leg 3. There are 2 setae at the internal margin of the 2nd endopodal segment in the Ifaluk specimen, none on that segment in Yamaguti's specimen (pl. 2, fig. 16).

Leg 4. There is a fine seta on the internal aspect of the 1st and 2nd endopodal segments of the Ifaluk specimen; these setae appear to be absent on the corresponding segments of Yamaguti's specimen (pl. 2, fig. 17).

In the shape of the legs and the presence of the seta on the basis there is complete conformity. Yamaguti does not mention the scale-shaped teeth, but these are obscured easily in a dissection. On leg 5, though it has almost the same shape and is composed of 1 free segment, Yamaguti figures 2 setae. The above-mentioned endopodal setae, as well as the seta on the basis, are chitinized very weakly and during dissection easily fold under the thick segments. The missing seta on leg 2 may have been removed during preparation. The above-mentioned particulars would certainly not suffice to separate two forms specifically if they were living on the same host.

The Ifaluk specimen was secured from the alga *Microdictyon*, apparently by washing, and originally it must have been attached to (the gills of) a fish. The species of fish, *Leptoscarus japonicus*, from which *Bomolochus leptoscari* was recorded originally, is restricted in its distribution to the immediate neighborhood of Japan, but several species of the genus and several closely allied genera are distributed widely over the southeastern Pacific and, though the fact has never been proved, it seems likely that *B. leptoscari* also occurs on the relatives of *L. japonicus* and thus covers a greater part of the Pacific than the Japanese record suggests. I have inspected the two specimens of *L. japonicus* in the collections of the Rijksmuseum van Natuurlijke Historie but have failed to find a parasite. During a study of the literature on *Bomolochus* when identifying my specimen, I have gained the impression that some of its species are somewhat loosely founded, the specificity of the host being the decisive character. A revision of more material will probably show that, for some species at least, a variety of hosts is available or will probably show that related hosts harbor forms of a certain parasite. Unfortunately, important taxonomic details (development of the antennular setation, structure of antennae and maxillipedes, setation of the legs) are omitted often from descriptions of new species or, when given, appear to be of a very doubtful standard. Only recently have some species been adequately described (Stock, 1953; Shiino, 1957), but even such a fairly well-known form as *Bomolochus bellones* Burmeister is still known from its original figure which, with the inadequate and faulty information taken from this old drawing, is reintroduced over and over again in scientific literature. In this genus, in particular, careful redescriptions of well-known forms, preferably from type hosts, are needed more than the inadequate introduction of new forms.

Bomolochus leptoscari originally was recorded from Hamajima in the Mie prefecture of Japan (one ♀ specimen, 1.15 mm., from *Leptoscarus japonicus* Cuvier and Valenciennes). The present specimen, again a ♀, was taken from the lagoon off Paugob Canoe House on Falarik Islet in the Ifaluk Atoll at a depth of 35–40 feet.

Order Harpacticoida

Suborder Polyarthra

Family Canuellidae Lang, 1948

Ifanella, new genus

Diagnosis.—Female unknown; males with head and 1st thoracic somite separate, rostrum big: a slightly curved, triangular plate with rounded apex. Genital apertures covered by big plates with 2 setae each. Abdomen not tapering, caudal rami widely separated, long, slightly diverging, with 6 marginal setae and 1 appendicular seta each. Antennules chirocerate, with strongly swollen 5th segment and flattened 6th segment. Antennae with 6-segmented exopodite and 3-segmented endopodite. Epipodite of maxillule strongly reduced, asetose. Basal endite of maxilla with strong, coalescent spine. Maxillipede short, coxa and basis small, endopodite short, 3-segmented. Legs 1 to 4 with 3-segmented exopodites and endopodites, endopodite of leg 2 modified. Setal formula:

	endopodite	*exopodite*
leg 1	1.1.212	0.0.113
leg 2	1.1.122	0.1.222
leg 3	1.1.121	0.1.121
leg 4	1.0.121	0.1.121

Leg 5 greatly reduced, no more than produced part of ventral wall of abdominal somite 1, with 4 setae.

Type species: *Ifanella chacei*, new species.

The generic name, *Ifanella*, has been composed from the first part of the name of the type locality, Ifaluk, with the ending -nella. The specific name *chacei* has been chosen as a dedication to Dr. Fenner A. Chase, Curator, Division of Marine Invertebrates, U.S. National Museum, Washington, D.C.

The present genus plainly belongs in Lang's family Canuellidae, at present comprising the genera *Sunaristes* Hesse, 1867 (type species *Sunaristes paguri* Hesse, 1867), *Canuella* T. and A. Scott, 1893 (type species *Canuella perplexa* T. and A. Scott, 1893), *Brianola* Monard, 1926b (type species *Brianola Stebleri* Monard, 1926), *Canuellina* Gurney, 1927 (type species *Canuellina insignis* Gurney, 1927) and *Canuellopsis* Lang, 1936 (type species *Canuellopsis typica* Lang, 1936). The new species could not be fitted into any of these genera because of the structure of the oral appendages and the setation of the legs. I have been obliged, therefore, to introduce a new genus for it, though with considerable trepidation, since the female failed to turn up in the collection. The setation, nevertheless, is so different from the other genera that I feel confident that the female can readily be recognized should it be discovered.

The genus can be fitted into Lang's key in the following way:

Key to the Genera of Canuellidae

1. 1st thoracic somite fused to head to form cephalic somite 3
   Head and 1st thoracic somite separated by distinct suture, especially visible on sides 2
2. Appendages on 3rd exopodal segment of leg 1 number 7. **Canuella** T. and A. Scott
   Appendages on 3rd exopodal segment of leg 1 number 5 . **Ifanella,** new genus
3. Exopodite of leg 1, 2-segmented . . . . **Canuellopsis** Lang
   Exopodite of leg 1, 3-segmented 4
4. Rostral base swollen; exopodite of antenna 6-segmented 5
   Rostral base not swollen; exopodite of antenna 7-segmented. **Canuellina** Gurney
5. Appendages on 3rd exopodal segment, leg 1, number 5; on 3rd segment, endopodite, 4 . . . . **Brianola** Monard
   Appendages on 3rd exopodal segment, leg 1, number 7; on 3rd segment, endopodite, 6 . . . . **Sunaristes** Hesse

Ifanella chacei, new species

FIGURES 11*b*,*c*, 17, 18

MATERIAL.—Loc. 81–A–3–d, 1 ad. ♂, 0.81 mm.

DESCRIPTION.—The following is based on the only specimen (male) captured (holotype), which, after being figured, has been stained, dissected, and the appendages mounted.

Adult male, total length 0.81 mm.; greatest diameter 0.21 mm.; length of longest furcal seta 0.38 mm.

General shape of body cylindrical, not compressed laterally, or dorsoventrally, scarcely narrowing caudally when viewed in dorsal aspect (fig. 11*b*). Cephalothorax oblong-ovate, without distinct separation continuing in abdomen. Head and 1st thoracic somite more or less separate; there is a line of separation visible in the lateral parts of the body (where it is as distinct as the line separating 1st and 2nd thoracic somite), but this line is only indicated very weakly on the back, where the 1st and 2nd thoracic somites are very well separated. Cephalon narrows slightly anteriorly into the broad rostral base; in lateral view the back is smoothly rounded, in front separated by a distinct groove from the big rostrum (fig. 11*c*). Rostrum dorsally a big triangular plate with rounded apex; in lateral aspect it appears to be slightly curved, pointing forward and very slightly downward, reaching halfway to 3rd antennular segment. 1st, 2nd, and 3rd thoracic somites of nearly same length; 4th and 5th thoracic somites of

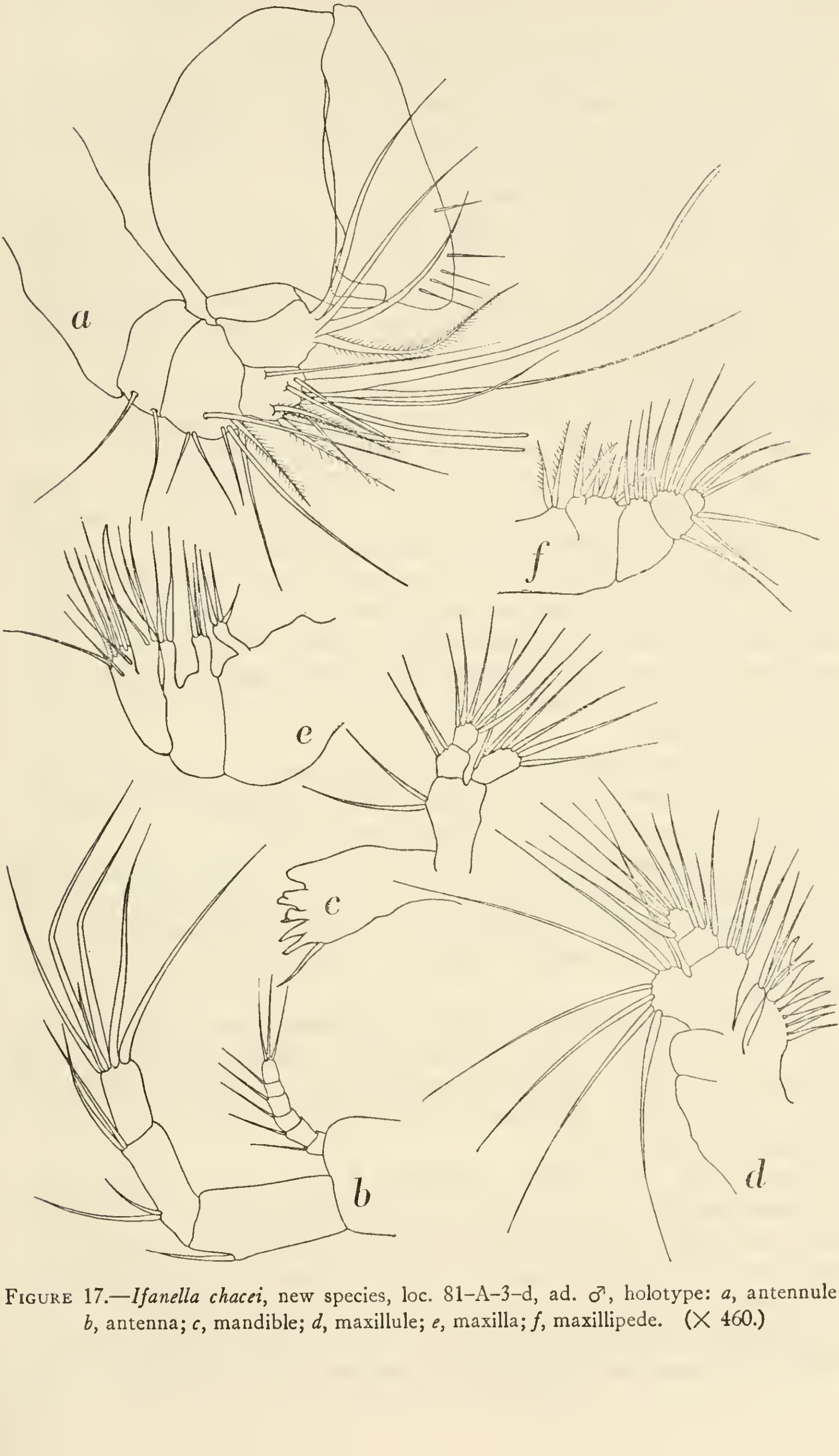


FIGURE 17.—*Ifanella chacei*, new species, loc. 81–A–3–d, ad. ♂, holotype: *a*, antennule; *b*, antenna; *c*, mandible; *d*, maxillule; *e*, maxilla; *f*, maxillipede. (× 460.)

nearly same length, each shorter than 2nd or 3rd. All thoracic somites have normally developed, rounded epimeral plates.

1st and 2nd abdominal somites comparatively long, of equal length; 3rd abdominal somite slightly shorter than 2nd; 4th abdominal somite half length of 1st or 2nd abdominal somite. No spinules or hairs along distal margins. 5th (anal) somite almost completely telescoped into 4th; operculum small, nude.

Rami of furca 4 times as long as wide, widely separated, slightly diverging, each ramus with broad base, gradually tapering, external border straight, internal border concave. There are 6 marginal setae and 1 appendicular seta on each ramus. Seta 1 short and fine, placed at internal furcal border, some distance from apex. Setae 4, 5, and appendicular setae fine, slightly longer than seta 1. Setae 2 and 3 lengthened and thickened, especially 2nd, which surpasses length of abdomen. Seta 6 small, at ⅓ the external margin from top.

Antennules (fig. 17*a*) chirocerate, very short, composed of 6-segments. Segment 1 fairly long, asetose. Segments 2 to 4 short and particularly setose, as can be seen by reference to figure 17*a*. Some of these setae are strongly haired. Segments 3 and 4 each with aesthetasc, each flanked by 2 setae. Segments 5 and 6 strongly developed, especially segment 5, to form powerful chela. Segment 6 is a flattened structure, resulting apparently from the fusion of several smaller segments, bearing 5 short setae. Segment 5 asetose, with a blunt tooth at the base.

Antenna with slender, 6-segmented exopodite. Segments 1 to 5 each with fine seta, segment 6 with 3 setae. Endopodite 3-segmented, number of setae 1, 4, and 6, respectively (fig. 17*b*).

Mandibular praecoxa well developed, with 5 teeth along cutting edge and a basal seta. Palp well developed, basipodite composed of fused coxa and basis, carrying 2 setae. Endopodite 2-segmented, 1st with 2, 2nd with 6 setae. Exopodite 1-segmented, ovate, with 6 setae (fig. 17*c*).

Arthrite of maxillule small, with 7 spiniform setae and fine, apical seta. There is one (coxal) endite with 2 setae; epipodite reduced, asetose. Basipodite undivided, with 4 setae. Exopodite distinct, with 7 long setae. Endopodite 2-segmented, with 4 and 5 setae respectively (fig. 17*d*).

Maxilla (fig. 17*e*) with 1 praecoxal, 2 coxal, and 1 basal endite. Praecoxal endite with 3 setae, coxal endites with 3 and 2 setae respectively; basal endite with a strong spine, coalescent with the endite, and 3 setae. Endopodite well developed, though undivided, with 7 setae in all.

Maxillipede (fig. 17*f*) composed of coxa, basis, and 3 segments. There are 2 setae on a slightly elevated part of the coxa and 6 on the

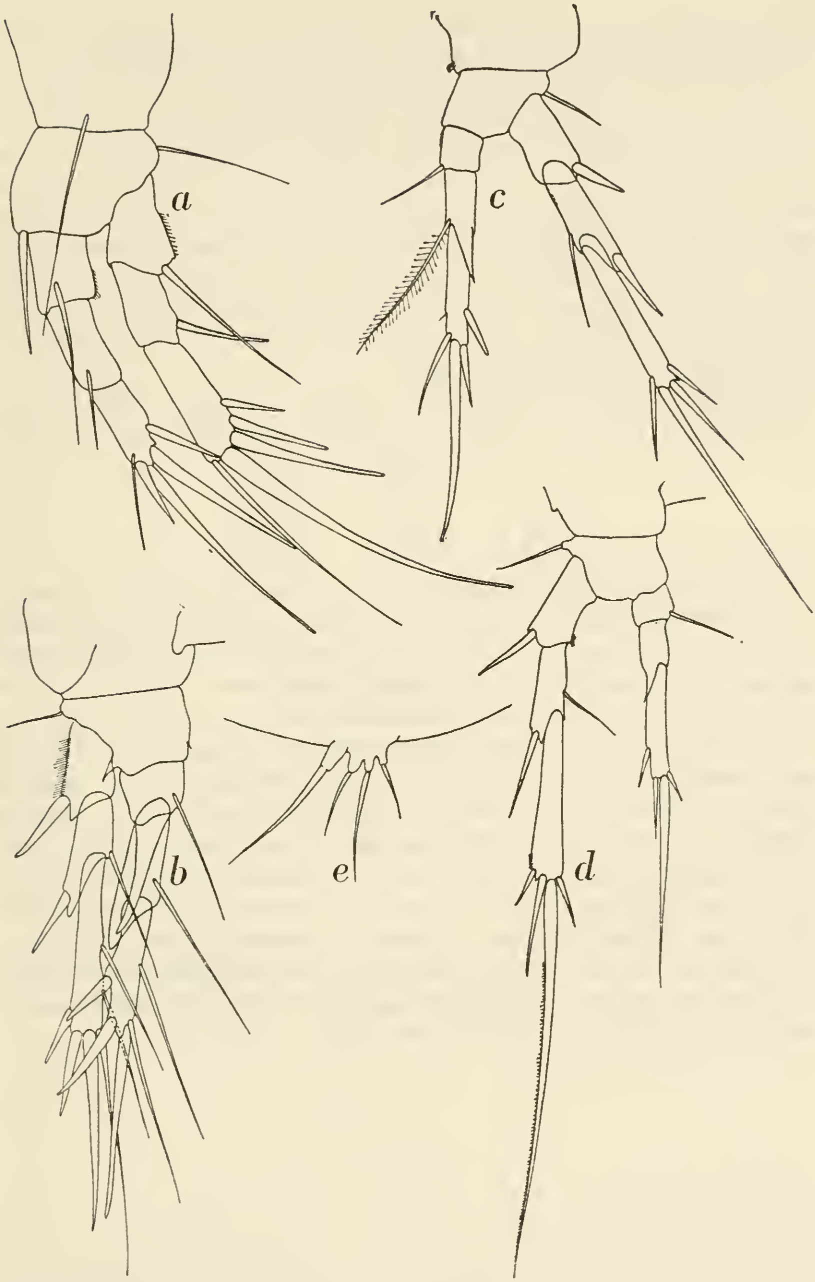


FIGURE 18.—*Ifanella chacei*, new species, loc. 81–A–3–d, ad. ♂, holotype: *a*, leg 1; *b*, leg 2; *c*, leg 3; *d*, leg 4; *e*, leg 5. (*a*, *e*, × 460; *b–d*, × 275.)

basis. Setae on the endopodite number 3 on the 1st segment, 4 and 2 external on the 2nd, and 3 and 1 external on the apical segment.

1st leg (fig. 18*a*) with seta on anterior aspect of coxa. Basis with external seta and internal spine. Exopodites and endopodites 3-segmented. Exopodal segments 1 and 2 with external spine, that on 1st of great length. 3rd exopodal segment 1½ times as long as 2nd, with 3 spines at external margin, placed close together on distal part of segment. Big apical spine and fine internal (almost apical) seta. Endopodal segments 1 and 2 each with internal seta. On the 3rd endopodal segment there are 5 appendages in all: 2 internal (1 spiniform, 1 setiform), 1 apical, and 2 external. Exopodites and endopodites of almost same length.

The details of legs 2 to 4 can best be taken from figures 18*b–d* and the setal formula. The endopodite of leg 2 is modified. Setal formula:

	endopodite	*exopodite*
leg 2	1.1.122	0.1.222
leg 3	1.1.121	0.1.121
leg 4	1.0.121	0.1.121

Leg 2 (fig. 18*b*) with particularly well-developed spine at apex of 1st endopodal segment. This spine reaches the apex of the curiously flattened 2nd endopodal segment. External border of 2nd endopodal segment of legs 3 and 4 spiniformly produced. Apical exopodal spines of legs 3 and 4 of considerable length.

Leg 5 (fig. 18*e*) very small, represented by small, produced part of distal ventral wall of 5th thoracic somite, bearing 4 setae. Genital area on 1st abdominal somite strongly chitinized and stained too heavily in my preparation, with the result that I cannot give a figure; the big genital plates covering the apertures each have 2 setae.

Color a light horny yellow, probably strongly faded in alcohol. Antennules slightly darker. No eye or pigmented spots visible.

REMARKS.—A single specimen of this curious form occurred in a washing of the alga *Lyngbya* from the lagoon shelf of Falarik Islet in the Ifaluk Atoll at a depth of about 6 feet.

Suborder Oligoarthra

Family Ectinosomidae G. O. Sars, 1903

Genus *Ectinosoma* Boeck, 1865

Ectinosoma (*Ectinosoma*) *dentatum* Steuer, 1940

FIGURES 19*a*,*b*, 20–22

Ectinosoma dentatum Steuer, 1940, pp. 124, 128, 129, figs. 1–10.—Lang, 1948, p. 205, fig. 114 (no. 4).—Božić, 1955, p. 4.—Noodt, 1955, p. 54.—Jakobi and Nogueira, 1960, p. 4.

MATERIAL.—Loc. 431, 1 ov. ♀, 0.35 mm. Loc. 588, 1 ov. ♀, 0.45 mm., 5 eggs; 1 ad. ♀, 0.47 mm. Loc. 589, 1 ad. ♀, 0.35 mm. (strongly contracted); 1 ad. ♂, 0.40 mm. (spermatophore visible in body). Loc. 590, 5 ov. ♀♀, 0.42–0.45 mm. (0.44), 3–6 eggs; 18 ad. ♀♀, 0.41–0.47 mm. (0.44); 3 ad. ♂♂, 0.32–0.38 mm. (0.36 mm). Loc. 591, 1 ad. ♀, 0.45 mm.; 2 ad. ♂♂, 0.38 and 0.35 mm. Loc. 592, 1 ad. ♀, 0.41 mm.; 2 ad. ♂♂, 0.33 and 0.36 mm.

DESCRIPTION.—The species unexpectedly proved to be fairly common in the Ifaluk collection. The following is based on a female and a male from locality 592; both have been dissected and mounted.

Adult female, total length 0.41 mm.; greatest diameter 0.09 mm.; length of longest furcal seta 0.20 mm.

General outline of body in dorsal aspect spindle-shaped, greatest diameter at end of cephalic somite; anterior part of body more or less rounded, rostral base distinctly visible in front of head, posterior part of body gradually tapering, without separation between cephalothorax and abdomen (fig. 19*a*). Head and 1st thoracic somite completely fused to form cephalic somite, which is slightly longer than combined lengths of thoracic somites 2 to 4. Line of back, in lateral view, smoothly curved into rostrum. Latter an elongated, triangular plate; apex rounded, pointing downward and slightly forward. Row of spines some distance from distal cephalic border, consisting of 8–10 threadlike spinules, sometimes very indistinctly visible and only apparent after dissection. Sides of cephalic somite slightly produced to cover basal parts of oral appendages. Thoracic somites 2 to 4 of nearly equal length; in lateral view, with broadly rounded sides. No spinules or hairs on thoracic somites.

Genital somite (fig. 19*b*) composed of fused abdominal somites 1 and 2; line of fusion visible in dorsal and lateral aspect as chitinized ridge, interrupted dorsally. Genital somite shorter than combined lengths of abdominal somites 3 and 4, which have about same length. No spinules of hairs on abdominal somites.

Anal somite about half length of abdominal somite 4, deeply cleft; anal flap broadly rounded, placed proximally. Furcal rami parallel, about as long as wide. Each ramus carries 5 marginal setae and 1

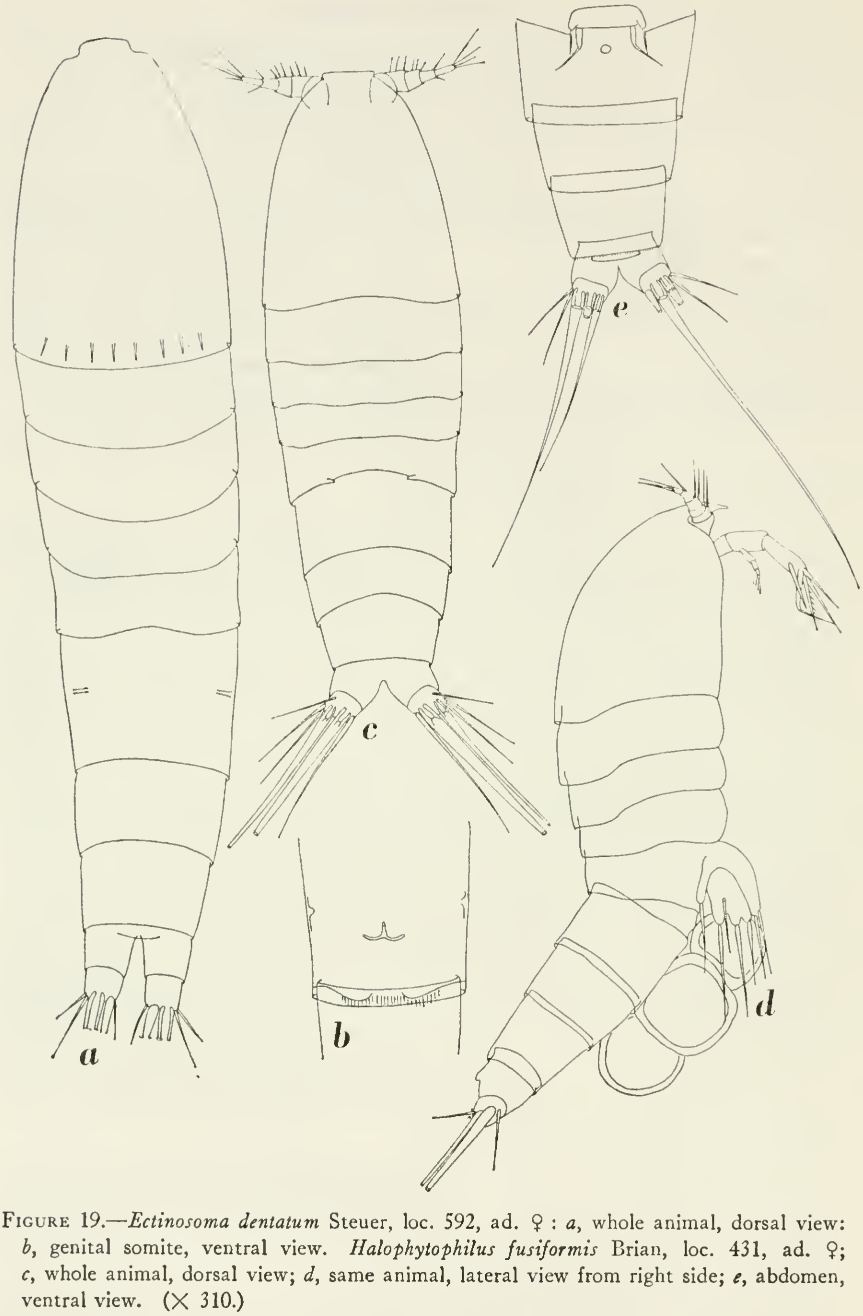


FIGURE 19.—*Ectinosoma dentatum* Steuer, loc. 592, ad. ♀: *a*, whole animal, dorsal view: *b*, genital somite, ventral view. *Halophytophilus fusiformis* Brian, loc. 431, ad. ♀; *c*, whole animal, dorsal view; *d*, same animal, lateral view from right side; *e*, abdomen, ventral view. (× 310.)

appendicular seta; setae 1, 4, and 5 are small, 4th being longest of set. Setae 2 and 3 lengthened, especially 3rd, which reaches ⅔ body length; 2nd shorter.

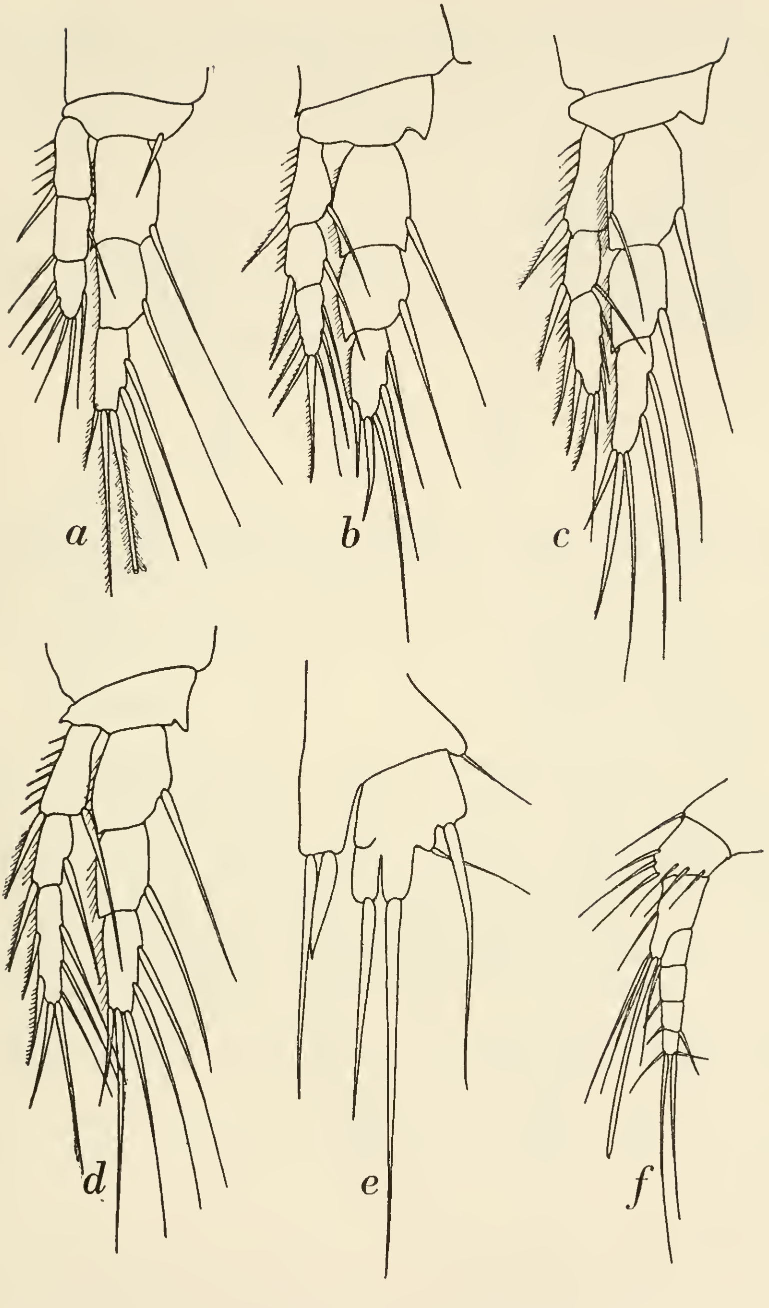


FIGURE 20.—*Ectinosoma dentatum* Steuer, loc. 592, ad. ♀: *a*, leg 1; *b*, leg 2; *c*, leg 3; *d*, leg 4; *e*, leg 5; *f*, antennule. (× 625.)

Ventrally the genital somite has the aspect illustrated in figure 19*b*. The genital field occupies a minor portion of the somite and is characterized mainly by the presence of small genital opercula, visible as a bilobated structure on the ventral surface. The distal ventral wall of the somite is produced into two flaps, bordered by exceedingly fine spinules.

Antennules (fig. 20*f*) very short, ⅓ length of cephalic somite, 3rd segment with small conical process bearing short aesthetasc and 2 fine setae. The antenna and mouth parts have not been studied in detail.

Legs 1 to 4 have 3-segmented exopodites and endopodites; the details can best be taken from figures 20*a–d* and from the setal formula:

	endopodite	*exopodite*
leg 1	1.1.221	0.1.123
leg 2	1.1.221	1.1.223
leg 3	1.1.221	1.1.322
leg 4	1.1.221	1.1.322

Leg 5 with distinct knob halfway along internal border of exopodite. Baso-endopodite reaches slightly beyond middle of exopodite. Exopodite with 4 spiniform setae; 1 and 4 have almost same length, seta 2 is longer, seta 3 much finer and short. Baso-endopodite with 2 setae, internal as long as 1 or 4 of exopodite; external seta short, dagger-shaped (fig. 20*e*).

Adult male, total length 0.36 mm.; length of longest furcal seta 0.18 mm.

General shape of body as in female, i.e., spindle-shaped in dorsal aspect, with greatest diameter at end of thoracic somite. Anterior part rounded, front with rostral base distinctly visible, posteriorly gradually tapering, no sharp demarcation between thorax and abdomen. Head and 1st thoracic somite completely fused to form cephalic somite, which is as long as combined lengths of thoracic somites 2 and 4. At the end of the cephalic somite there is the same row of threadlike spinules, some distance from the border. 5th thoracic somite rather small in dorsal aspect but distinctly visible in lateral view; 1st and 2nd abdominal somites separate (fig. 21*a*). A small spermatophore is visible in the 1st abdominal somite. Abdominal somites 1 to 4 have nearly the same length, distal borders smooth, without hairs or spinules. Anal somite short; anal flap distinctly rounded, clearly visible. Furcal rami as in the female; development of the setae also identical.

The ventral aspect of the genital somite is of characteristic appearance: the genital operculum is a very prominent feature, forming a squarish lobe, provided on each side with two powerful setae. The median seta almost reaches the articulation between abdominal somites 2 and 3; the external seta is much longer and reaches the anal

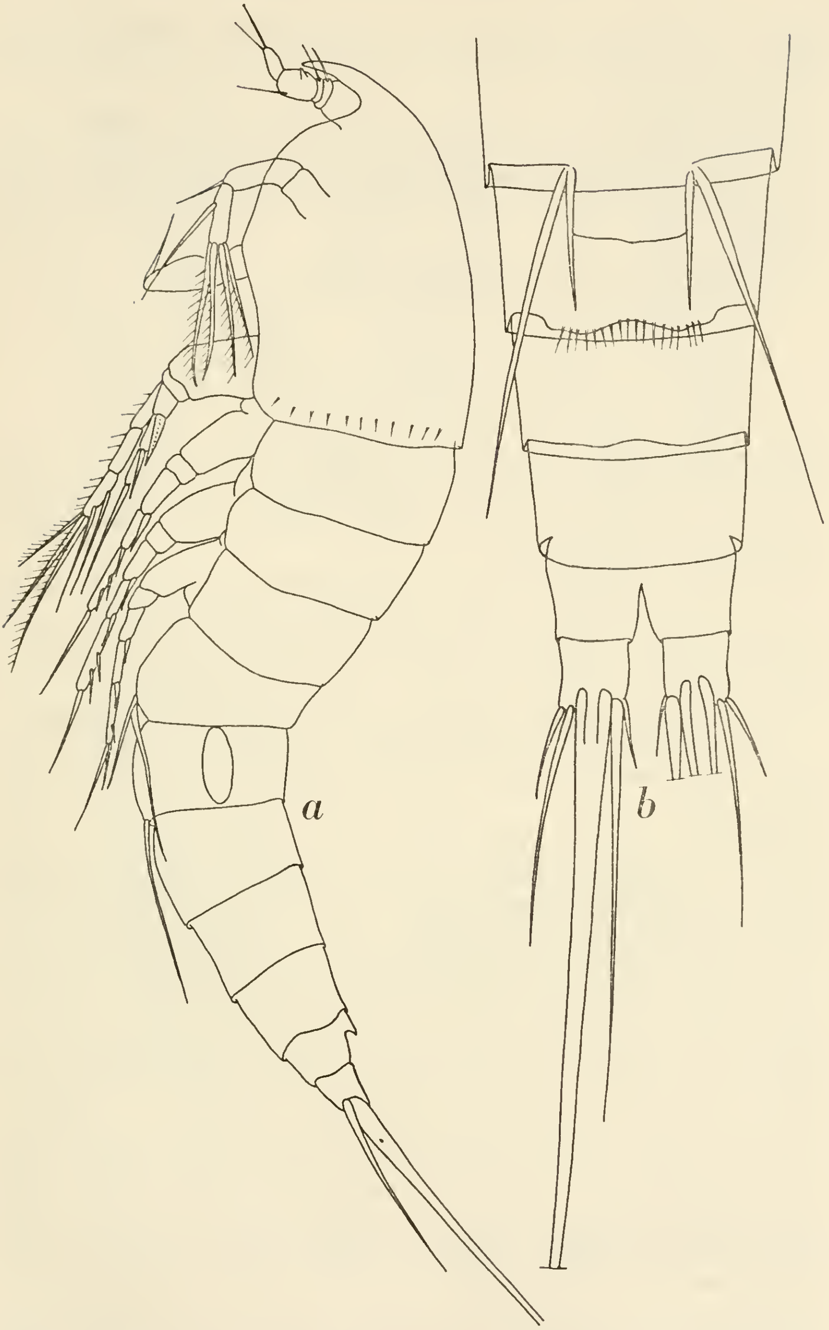


FIGURE 21.—*Ectinosoma dentatum* Steuer, loc. 592, ad. ♂: *a*, whole animal, lateral view from left side; *b*, abdomen, ventral aspect. (*a*, × 375; *b*, × 625.)

somite. Distal ventral border of 2nd abdominal somite with, on right and left side, indistinctly formed lobe, bordered by very fine spines (fig. 21*b*).

Rostrum semicircular, curved plate, covering basal parts of antennules. Antennules 5-segmented; segment 4 elongate, slightly swollen, forming joint with 5th segment, which apparently results from fusion of several smaller segments. Antenna and mouth parts not studied in detail.

The legs have the following setal formula:

	endopodite	*exopodite*
leg 1	1.1.221	0.1.123
leg 2	1.1.221	1.1.223
leg 3	1.1.221	1.1.322
leg 4	1.1.221	1.1.332

There are practically no differences in the structure of legs 1 to 4 in the sexes; the only difference I could detect is the slightly more proximal insertion of the spines along the external border of the exopodal segments (figs. 22*a*–*d*).

Leg 5 with exopodite and baso-endopodite well separated and of nearly the same length. Baso-endopodite with 2 spiniform setae of unequal lengths, external being much smaller. Exopodite with 4 setae; lengths and positions can best be taken from figure 22*e*. External seta of baso-endopodite fine, placed on slightly elevated part.

Color transparently yellowish-green; contents of gut and fecal pellets visible as darker, green-brown spots in body. No eye or eyespots visible.

REMARKS.—As also appears from the setal formula, there are 3 spines at the external margin of the 3rd exopodal segment of the 1st and 2nd leg and 2 on the same segment of legs 3 and 4. In *Ectinosoma* (*Ectinosoma*) *tenuipes* T. and A. Scott, 1894, a closely allied form, there are 3, 3, 3, and 2 on the corresponding segments of legs 1, 2, 3, and 4, respectively. The total number of appendages on the 3rd exopodal segment of these legs is 6, 7, 7, 7 in *E. dentatum* and 6, 7, 7, 6 in *E. tenuipes*, but on the 3rd leg the same number of appendages have a different distribution. This characteristic, which is also mentioned by Steuer (1940, p. 126) in his original diagnosis of *E. dentatum*, appears to have escaped Lang's attention but may serve to separate both closely related forms. The threadlike spinules on the cephalic somite are easily removed and the above-mentioned additional, differentiating characteristic may be of particular importance in the males, where the differences in the structure of leg 5 between both species are minute.

E. dentatum was described originally from Anfouchi Bay near the port of Alexandria, Egypt, in the eastern Mediterranean, from a

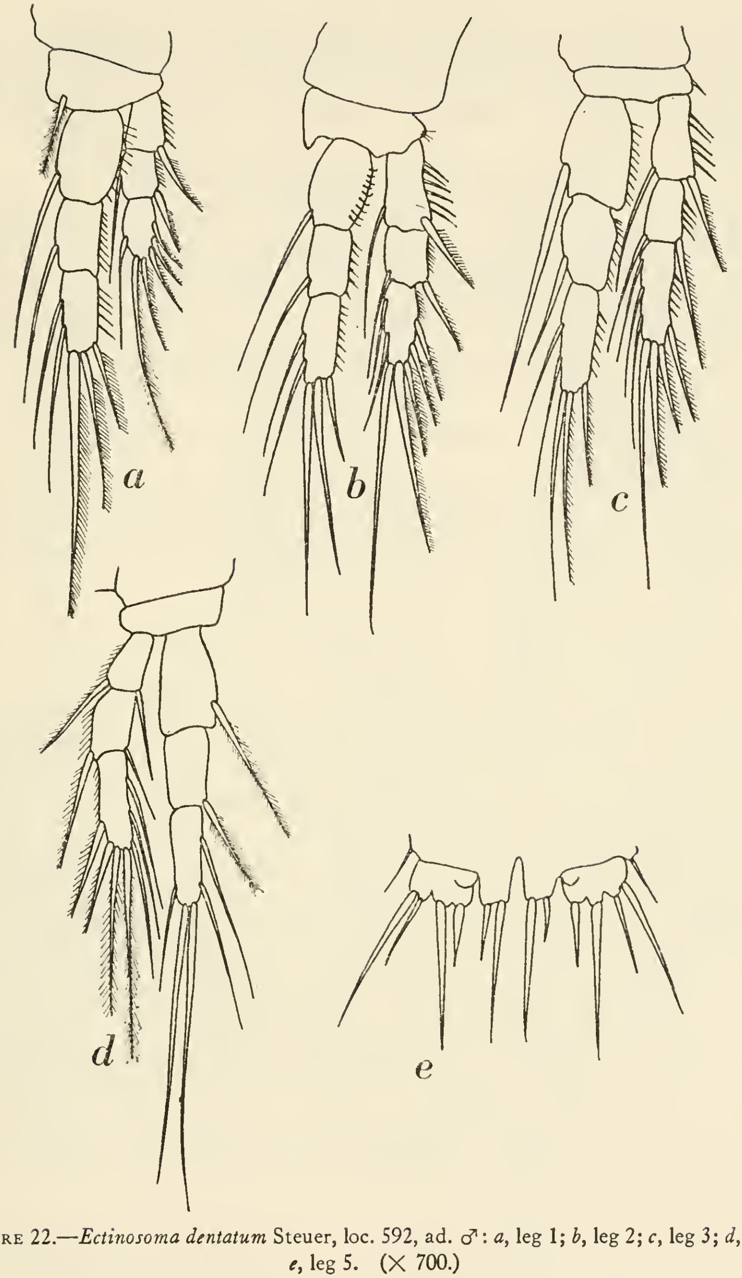


FIGURE 22.—*Ectinosoma dentatum* Steuer, loc. 592, ad. ♂: *a*, leg 1; *b*, leg 2; *c*, leg 3; *d*, leg 4; *e*, leg 5. (× 700.)

Posidonia-covered bottom, by Steuer (1940), who recorded 9 females (448–490μ) and 2 males (350–406μ). Noodt (1955) mentions 4 female specimens and 1 male specimen from the Sea of Marmara off

Turkey (♀ 480μ). In the Ifaluk collection it occurred once in a washing of the alga *Caulerpa* and in abundance in sand samples taken at various distances from the reef edge. It might be considered tentatively as a characteristic element of the Ifaluk interstitial sand fauna.

Genus *Halophytophilus* Brian, 1918

This genus now comprises the following four species: *H. fusiformis* Brian, 1918 (type species), *H. spinicornis* G. O. Sars, 1920, *H. similis* Lang, 1948, and *H. triarticulatus* Klie, 1949. All specimens in the Ifaluk collection plainly represent *H. fusiformis* and are all females.

Halophytophilus fusiformis (Brian, 1918)

FIGURES 19*c–e*, 23

Alophytophilus fusiformis Brian, 1917, p. 177 (nomen nudum); 1918, p. 74, figs. 1–10.

Halophytophilus fusiformis.—Sars, 1920, p. 48.—Brian, 1921, p. 56, pl. 11 (figs. 12–17); 1923, p. 129; 1923a, p. 176; 1928, p. 36; 1928a, p. 298, 305.—Monard, 1928, p. 296, fig. 4 (no. 1), fig. 6 (no. 2).—Vàtova, 1928, p. 180.—Monard, 1935, p. 23; 1935a, p. 11; 1936, p. 50; 1937, p. 35.—Lang, 1948, p. 249, fig. 130 (no. 1).—Klie, 1949, p. 106.

MATERIAL.—Loc. 431, 1 ov. ♀, 0.26 mm. Loc. 638, 1 ad. ♀, 0.38 mm. Harry Sta. 41, 1 ad. ♀, 0.28 mm.

DESCRIPTION.—The three female specimens present show a considerable discrepancy in length (0.26–0.38 mm.). The following is based on the smallest specimen from locality 431, which was found first.

Adult female, total length 0.26 mm.; greatest diameter 0.05 mm.; length of longest furcal seta 0.10 mm.

Small, compactly built species with short, spindle-shaped body. Greatest diameter at end of cephalic somite, very gradually narrowing posteriorly, frontal part ovoid, obtuse at rostral base (fig. 19*c*). Abdomen and cephalothorax not distinctly separated. Head and 1st thoracic somite completely fused to form cephalic somite, which is as long as combined lengths of thoracic somites 2 to 5. In lateral aspect (fig. 19*d*), line of back smoothly curving into rostrum. Latter a downwardly directed, triangular plate with rather broad base and pointed at apex, only the base visible from above. Thoracic somites 2 to 4 of about same length, short. 5th thoracic somite slightly shorter than preceding somite, remarkable by its distal dorsal border, which shows small notch on each side.

Abdomen ⅔ length of cephalothorax. Genital somite resulting from fusion of abdominal somites 1 and 2, no line of fusion being visible. It is only slightly longer than abdominal somites 3 or 4, which have the same length. Fine row of hairs along ventral distal border of 4th abdominal somite (fig. 19*e*). Anal somite about half length of 4th, deeply cleft; anal flap small, placed proximally. Rami of furca diverg-

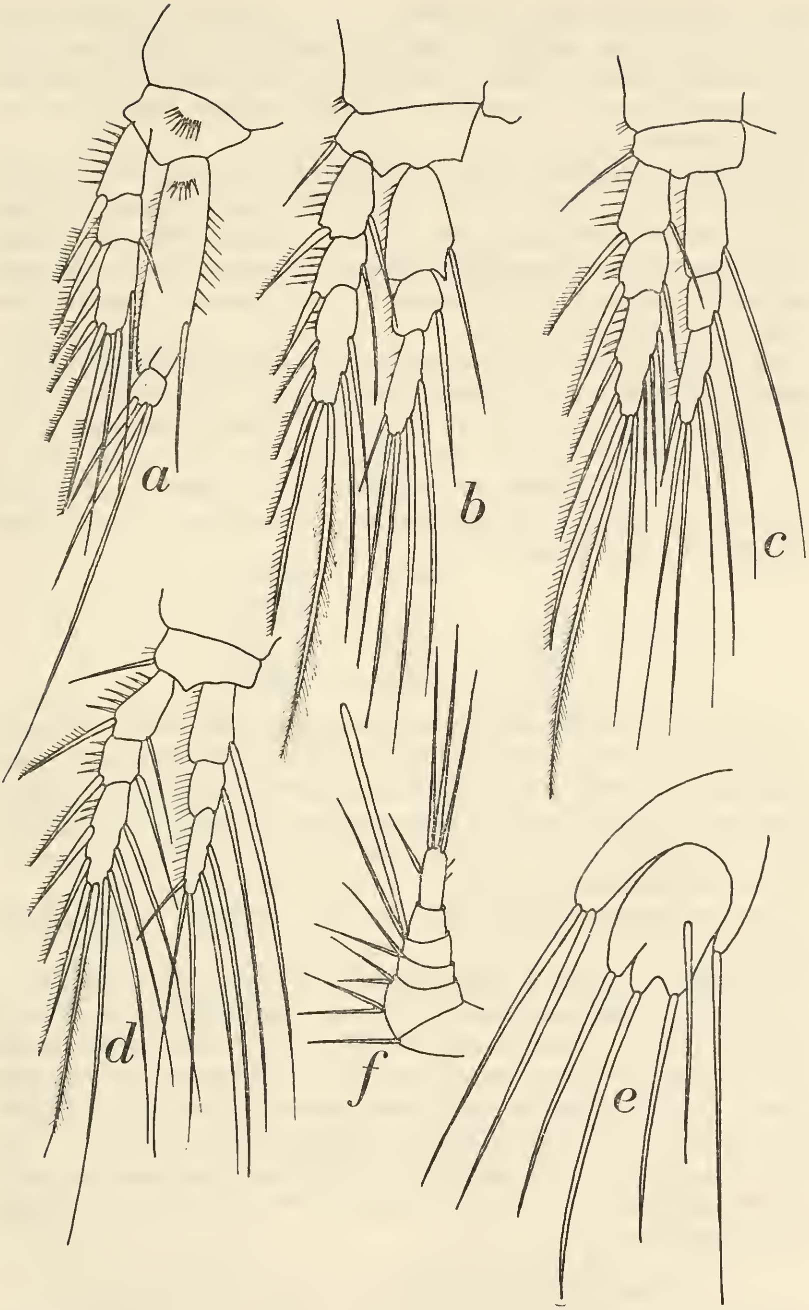


FIGURE 23.—*Halophytophilus fusiformis* Brian, loc. 431, ad. ♀: *a*, leg 1; *b*, leg 2; *c*, leg 3; *d*, leg 4; *e*, leg 5; *f*, antennule. (× 850.)

ing, broader than long in proportion of 3:2, with 5 marginal setae and 1 appendicular seta each. Setae 4, 5, and appendicular seta short, seta 1 of intermediate length. Setae 2 and 3 lengthened and thickened, 2nd reaching ⅓ body length and slightly swollen basally; seta 3 slightly shorter.

Antennules extremely short, 6-segmented; 4th segment, though provided with an aesthetasc, not larger than preceding segment and without conical process; segment 6 cylindrical, rather long (fig. 23*f*).

My preparation of the antenna and mouth parts of this small specimen was unsuccessful, with the result that I cannot describe these parts in detail here.

Leg 1 with 3-segmented exopodite and 2-segmented endopodite; the setation follows from the setal formula and figure 23*a*. 1st endopodal segment longer than whole exopodite. Internal seta inserting at ⅔ internal margin from base; 2nd endopodal segment small, with 3 setae. Coronula of spinules on basis and one at base of 1st endopodal segment. Exopodites and endopodites of legs 2 to 4, 3-segmented (figs. 23*b–d*). Setal formula:

	endopodite	*exopodite*
leg 1	1.3	0.1.123
leg 2	1.1.221	1.1.223
leg 3	1.1.221	1.1.323
leg 4	1.1.221	1.1.323

Leg 5 (fig. 23*e*) comparatively big for such a small species. There is a strong seta on the external lobe of the baso-endopodite and 2 setae on the baso-endopodite itself; it reaches ⅔ the length of the exopodite. There are 3 marginal setae on the exopodite, each placed on a distinct socle. In addition, there is a fine seta on the exopodite, attached to the internal surface (fig. 23*e*).

Color completely faded, transparently greenish. No eyespot visible.

The specimen carries 4 big eggs closely applied to the abdomen.

REMARKS.—*Halophytophilus fusiformis* is well distributed through the Mediterranean: Banyuls-sur-Mer, France (Monard,1928); Genoa, Italy (Brian, 1917, 1918, 1921); Rovinj, Yugoslavia, on the Adriatic (Brian, 1923); Astypalaia and Telos Islands in the Aegean (Brian, 1928); Tunisia (Monard, 1935); and Algeria (Monard, 1937). This is the first record of the species outside the Mediterranean; as in previous habitats it occurred on algae and was obtained in washings of *Caulerpa*, etc.

Family Harpacticidae G. O. Sars, 1904

This family, at the suggestion of Lang (1948, pp. 309, 346) can be divided into two subfamilies with the following genera:

Subfamily Harpacticinae* G. O. Sars, 1904: genera *Harpacticus* Milne-Edwards, 1840 (type species *Cyclops chelifer* O. F. Müller, 1776), *Tigriopus* Norman, 1868 (type species *Cyclops brevicornis* O. F. Müller, 1776), *Harpacticella* G. O. Sars, 1908 (type species *H. inopinata* G. O. Sars, 1908), *Perissocope* Brady, 1910 (type species *P. typicus* Brady, 1910), and *Discoharpacticus* Noodt, 1954 (type species *D. mirabilis* Noodt, 1954.

Subfamily Zausodinae Lang, 1948: genera *Zaus* Goodsir, 1845 (type species *Zaus spinatus* Goodsir, 1845), *Zausodes* C. B. Wilson, 1932 (type species *Zausodes arenicolus* C. B. Wilson, 1932), and *Zausopsis* Lang, 1934 (type species *Zausopsis mirabilis* Lang, 1934).

In the Ifaluk collection occur specimens of two species of *Harpacticus*, one of which is new to science, and of a new species of *Perissocope;* all are described below.

Genus *Harpacticus* Milne-Edwards, 1840

Since the publication of Lang's monograph, several new forms of this genus have been introduced. The following survey shows the present extent of the genus.

FEMALES	MALES
Cyclops chelifer O. F. Müller, 1776	*C. chelifer* O. F. Müller, 1776
(=*Harpacticus helgolandicus* Poppe, 1884)	
C. brevicornis O. F. Müller, 1776	*C. brevicornis* O. F. Müller, 1776
(=*H. crassicornis* Brady and Robertson, 1876)	
H. uniremis Krøyer, 1842	*H. uniremis* Krøyer, 1842
(=*H. chelifer* var. *arcticus* Poppe, 1884; *H. c.* var. *scotti* Mrázek, 1902)	
H. gracilis Claus, 1863	*H. gracilis* Claus, 1863
(=*H. dentatus* Kriczagin, 1873; *H. fucicolus* T. Scott, 1912; *H. giesbrechti* Klie, 1927; *H. gracilis* var. *orientalis* Sewell, 1924; *H. nicaeensis* var. *pontica* Czerniavski, 1868)	
H. nicaeensis Claus, 1866	*H. nicaeensis* Claus, 1866
(=*H. aegialobates* Monard, 1926; *H. nicaeensis* var. *fortior* Czerniavski, 1868)	
H. flexus Brady and Robertson, 1873	*H. flexus* Brady and Robertson, 1873
H. obscurus T. Scott, 1895	*H. obscurus* T. Scott, 1895
H. poppei Richard, 1897	
H. glaber Brady, 1899	
H. furcifer Giesbrecht, 1902	*H. furcifer* Giesbrecht, 1902
H. Clausi A. Scott, 1909	*H. Clausi* A. Scott, 1909
H. pulvinatus Brady, 1910	*H. pulvinatus* Brady, 1910
(=*H. piriei* T. Scott, 1912)	
H. littoralis G. O. Sars, 1910	*H. littoralis* G. O. Sars, 1910
H. falklandi T. Scott, 1914	*H. falklandi* T. Scott, 1914
H. tenellus G. O. Sars, 1920	*H. tenellus* G. O. Sars, 1920
H. superflexus Willey, 1920	*H. superflexus* Willey, 1920
H. compsonyx Monard, 1926	*H. compsonyx* Monard, 1926
(=*H. compsonyx* var. *nolesius* Brian, 1928; *H. c.* var. *nolisius* Brian, 1928a)	

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*Lang's name *Harpacticellinae* (1944, p. 9) is illegitimate.

H. meridionalis G. O. Sars, 1927	*H. meridionalis* G. O. Sars, 1927
H. gurneyi Jakubisiak, 1933	*H. gurneyi* Jakubisiak, 1933
H. furcatus Lang, 1936c	*H. furcatus* Lang, 1936c
H. islandicus Klie, 1939	*H. islandicus* Klie, 1939
H. septentrionalis Klie, 1939	*H. septentrionalis* Klie, 1939
H. trisetosus Lang, 1948	

The position of the following species is uncertain:

H. concinnus Dana, 1849
H. sacer Dana, 1849
H. virescens Dana, 1849
H. aquilinus Fischer, 1860
H. macrodactylus Fischer, 1860
H. depressus Boeck, 1864
H. chelifer var. T. Scott, 1894
H. robustus Brady, 1910
H. boehleri Pesta, 1916
H. koenigi Pesta, 1916

The following species, which now belong to other genera, have been introduced:

H. acutifrons Dana, 1849 (=*Euterpina acutifrons* (Dana, 1849))
H. brevicornis Giesbrecht, 1902 (not O. F. Müller, 1776) (=*Tigriopus californicus* Baker, 1912)
H. cristatus A. Scott, 1909 (=*Perissocope cristatus* (A. Scott, 1909))
H. croni Krøyer, 1842 (=*Parathalestris croni* (Krøyer, 1842))
H. curticornis Boeck, 1864 (=*Tigriopus brevicornis* (O. F. Müller, 1776))
H. fortificationis Fischer, 1860 (=*Laophonte cornuta* Philippi, 1840)
H. fulvus Fischer (=*Tigriopus brevicornis* (O. F. Müller, 1776))
H. gibber Krøyer, 1842 (=*Thalestris gibber* (Krøyer, 1842))
H. linearis Dana, 1853 (nomen nudum) (=*Lourinia armata* (Claus, 1866))
H. simplex Brady, 1910 (=*Perissocope typicus* Brady, 1910)
H. xenus Monard, 1926 (=*Perissocope xenus* (Monard, 1926))

The species *Harpacticus clausi* A. Scott has been included in the list of well-described species because recently it has been redescribed by Sewell (1940, p. 153, figs. 9a–h, 10a–i). *H. boehleri* has been mentioned among the uncertain species (and has been excluded from the keys) because certain details of the mouth parts have not been described by Pesta. For *H. islandicus* Klie, 1939, and *H. septentrionalis* Klie, 1939, included among the well-described forms, the description of the male is not complete. These three species, nevertheless, can be recognized when found; complete descriptions and especially complete drawings urgently are needed.

The following keys, for the identification of males and females, have been adapted from Lang (1948, p. 317); they are far from satisfying because very few species have been described so completely that characters of diagnostic value can be compared adequately.

Key to the Species of *Harpacticus*

FEMALES

1. Furcal rami 1½ times or more longer than wide. 2
Furcal rami as long as wide or wider than long. 3

2. Furca 1½ times as long as wide; basis of maxillipede convex on both sides, twice as long as wide. 2nd segment of endopodite leg 4 with 1 seta. **H. furcatus** Lang
Furca more than twice as long as wide; basis of maxillipede only slightly convex on external border, internal border straight, 3 times as long as wide. 2nd segment endopodite leg 4 with 2 setae. . **H. furcifer** Giesbrecht

3. Basis of maxillipede with straight or convex internal border 4
Basis of maxillipede with concave internal border or margin deeply incised to form a square notch 5

4. 2nd segment of endopodite leg 2 with 2 internal setae. **H. superflexus** Willey
2nd segment of endopodite leg 2 with 1 internal setae. **H. flexus** Brady and Robertson

5. Antenna with pectinate spines 6
Spines of antenna normally developed. 7

6. Total number of appendages on terminal exopodal segment of legs 2 to 4 is 7, 8, and 8, respectively . . . . **H. pulvinatus** Brady
Setae on terminal exopodal segment of legs 2 to 4 number 6, 7, and 8, respectively . . . . **H. compsonyx** Monard

7. Baso-endopodite with 3 spines or setae 8
Baso-endopodite with 4 or 5 spines or setae, one of which may be small 12

8. Expodite of leg 5 with 4 setae . . . . **H. glaber** Brady
Exopodite with 5 setae 9

9. Median seta of baso-endopodite leg 5 spinulose . . **H. confusus,** new species
Median seta of baso-endopodite leg 5 normally developed 10

10. Terminal segment of exopodite leg 1 with 3 claws, no seta present. **H. chelifer** (O. F. Müller)
Terminal segment of exopodite leg 1 with 3 or 4 claws and a seta 11

11. Terminal segment of exopodite leg 1 with 3 claws and 1 seta. **H. trisetosus** Lang
Terminal segment of exopodite leg 1 with 4 claws and 1 seta. **H. gurneyi** Jakubisiak

12. Baso-endopodite of leg 5 with 5 spiniform setae. **H. meridionalis** G. O. Sars
Baso-endopodite of leg 5 with 4 spiniform setae. 13

13. External spine on baso-endopodite of leg 5 very small, ¼ the length of exopodite . . . . **H. islandicus** Klie
External spine on baso-endopodite of leg 5 as long as exopodite of leg 5 or slightly shorter 14

14. Baso-endopodite of leg 5 with a transversal row of spinules. **H. uniremis** Krøyer
No row of spinules on baso-endopodite of leg 5 15

15. On terminal segment of endopodite leg 1 there are, in addition to claws, some small spines, one of which points upward . . **H. nicaeensis** Claus
In addition to claws on terminal segment of endopodite leg 1 there are some spinules or hairs, none of which points upward 16

16. Basis of maxillipede twice as long as wide. 17
    Basis of maxillipede 1½ times as long as wide 21
17. Baso-endopodite slender, at least as long as broad, reaching halfway along exopodite . . . . **H. poppei** Richard
    Baso-endopodite of leg 5 broader than long, reaching maximally ⅓ the length of exopodite 18
18. Basis of maxillipede at apex with internally directed spiniform process. **H. tenellus** G. O. Sars
    Basis of maxillipede normally developed 19
19. 2nd segment endopodite of leg 2 with 2 internal setae. **H. septentrionalis** Klie
    2nd segment endopodite of leg 2 with 1 seta at internal border 20
20. Exopodite of leg 5 long and slender, 3 times as long as wide, internal and external border parallel. . . . . **H. clausi** A. Scott
    Exopodite not more than twice as long as broad, ovate. **H. obscurus** T. Scott
21. Furca very short, 4 times wider than long . . . . . **H. falklandi** T. Scott
    Furca about twice as wide as long 22
22. Basis of maxillipede deeply concave . . . . **H. gracilis** Claus
    Basis of maxillipede deeply incised to form square notch. **H. littoralis** G. O. Sars

MALES

1. Furca 1½ times or more longer than wide 2
   Furca about as long as wide or wider than long 3
2. Furca more than twice as long as wide . . . . . . **H. furcifer** Giesbrecht
   Furca maximally 1½ times longer than wide . . . . **H. furcatus** Lang
3. Basis of maxillipede internally straight or convex 4
   Basis of maxillipede internally deeply concave or incised with square notch. 5
4. Terminal segment of endopodite leg 1 with 2 claws and 1 plumose seta. **H. superflexus** Willey
   Terminal segment of endopodite leg 1 with 2 claws and 1 nude seta. **H. flexus** Brady
5. Antenna with pectinate spines 6
   Antenna with normally developed spines 7
6. Appendages on terminal segment of exopodites legs 2 to 4, number 7, 8, and 8, respectively . . . . **H. pulvinatus** Brady
   Appendages on terminal segment of exopodites legs 2 to 4, number 6, 7, and 8, respectively . . . . **H. compsonyx** Monard
7. 1st segment of exopodite leg 3 lengthened, reaching beyond articulation between segments 2 and 3 of endopodite . . . **H. chelifer** (O. F. Müller)
   1st exopodal segment of leg 3 shorter, not reaching the articulation between segments 2 and 3 of endopodite 8
8. Segment 2 of exopodite leg 2 lengthened, much longer than segment 1 of same exopodite . . . . **H. falklandi** T. Scott
   Segments 1 and 2 of exopodite of leg 2 of nearly the same length 9
9. Anterior aspect of segments 1 and 2 of endopodites legs 3 and 4 with small spines. . . . . **H. obscurus** T. Scott
   Anterior aspect of endopodites legs 3 and 4 nude or segment 2 of endopodite legs 3 and 4 with 3 thin spinules 10
10. Exopodite leg 1 distinctly 3-segmented . . . . **H. meridionalis** G. O. Sars
    Exopodite of leg 1 indistinctly 3-segmented or only 2-segmented 11

11. 1st segment of endopodite leg 2 about 3 times as long as wide. **H. tenellus** G. O. Sars
    1st segment of endopodite leg 2 about 2½ times as long as wide or shorter . . 12
12. Terminal segment of endopodite leg 1 with some spinules, one of which points upward . . . . **H. nicaeensis** Claus
    Terminal segment of endopodite leg 1 with some fine spinules or hairs, none of which points upward 13
13. Terminal segment of exopodite of leg 1 with 6 appendages: 5 claws and 1 seta. **H. uniremis** Krøyer
    Terminal exopodal segment of leg 1 with 5 appendages: 4 claws and 1 seta 14
14. 2nd segment of endopodite leg 2 produced into a long spiniform process, reaching beyond tip of exopodite 15
    Spiniform process of 2nd endopodal segment of leg 2 short, just reaching tip of exopodite 16
15. Exopodite leg 5 with 5 appendages: 4 spines and 1 seta . . **H. gracilis** Claus
    Exopodite of leg 5 with 6 appendages: 3 spines and 3 setae, gradually decreasing in length . . . . **H. confusus,** new species
16. Exopodite of leg 5 spatulate, strongly narrowed at apex. **H. septentrionalis** Klie
    Exopodite of leg 5 not spatulate, only slightly narrowed at apex 17
17. Internal border of coxa of maxillipede deeply incised to form a square notch . . . . **H. littoralis** G. O. Sars
    Internal border of coxa of maxillipede concave 18
18. Exopodite of leg 5, 3 to 4 times as long as wide . . . . **H. clausi** A. Scott
    Exopodite of leg 5, no more than twice as long as wide . **H. islandicus** Klie

Harpacticus clausi A. Scott, 1909

FIGURES 24–26

Harpacticus clausi A. Scott, 1909, p. 201, pl. 59 (figs. 9–14a).—Sewell, 1940, pp. 153, 353, 355, 363, 364, figs. 9, 10.—Lang, 1948, p. 335, fig. 153 (no. 2).—Krishnaswamy, 1953, p. 67.

MATERIAL.—Loc. 425, 1 ad. ♂, 0.48 mm.

DESCRIPTION.—This male specimen shows such a great resemblance to the male of *Harpacticus clausi* described by Sewell (1940) that it has been brought to that species. The description is from this male specimen, which has been dissected and mounted.

Adult male, total length 0.48 mm.; greatest diameter 0.15 mm.; greatest length of furcal seta 0.30 mm.; proportion of cephalothorax and abdomen 11:5.

Body fairly slender in dorsal aspect, greatest diameter at end of cephalic somite, anteriorly narrowing and front broadly rounded, with rounded protuberance between antennular bases, representing rostral base. Posteriorly body tapers slightly, division between cephalothorax and abdomen distinctly marked.

Head and 1st thoracic somite completely fused to form cephalic somite; this somite 1⅓ times as long as combined lengths of thoracic somites 2 to 4. Lateral borders of cephalic somites not produced, with the result that oral parts are freely visible in lateral aspect (fig. 24). Rostral base visible in dorsal aspect, separated from cephalic somite by groove; in lateral aspect visible as curved plate, slightly shorter than 1st antennular segment, pointing obliquely downward and forward, in sharp contrast to condition found in *H. confusus.* Epimeral plates of thoracic somites 2 to 4 rounded, somites 2 and 3 of about same length; 4th thoracic somite shorter, in lateral aspect broadly rounded.

5th thoracic somite visible in dorsal aspect as narrow band; in lateral aspect it is better marked. Abdominal somites 1 to 4 of nearly same length; somites 1 and 2 separate. Somite 1 with, on both sides, lateroventral row of spinules at distal end of somite; somites 2 and 3 have a completely closed row of fairly coarse spinules at their distal margins. Abdominal somite 4 with some ventrocaudal spinules. Anal somite distinctly shorter than preceding somites; anal flap just visible in lateral aspect; some spinules are found near flap.

Furcal rami twice as broad as long, with 5 marginal setae and 1 appendicular seta each. Appendicular seta and setae 1, 4, and 5 of moderate length; setae 2 and 3 lengthened and thickened, especially 2nd, which reaches ⅗ length of body.

Antennules chirocerate, 5th segment swollen, almost globular, with distinct basal tooth and finely crenulated lamella; apical segment small. The setation has been represented in figure 25*a*; there are 2 aesthetascs, one on segment 4 and one on segment 5, but one of the setae on the apical segment is thickened and may have a sensory function.

Antenna (fig. 25*b*) with allobasis and single endopodal segment. Exopodite small, 2-segmented, basal segment with 2, apical with 4, setae. Allobasis with single internal seta. Endopodite with 3 spines, 4 geniculate setae, and a fine appendicular seta.

I failed to obtain a suitable preparation of the mandible.

Maxillule (fig. 25*c*) as in *H. chelifer;* arthrite of praecoxa with 6 teeth, strong basal seta, and 2 fine apical setae. Coxal endite well developed, bearing 2 setae. Basal endite small, bearing 1 strong seta and 1 fine seta; basipodite with 3 setae. Whole endopodite reduced to form single segment with 3 setae. Exopodite styliform, with 3 setae.

Maxilla small (fig. 25*d*), articulation indistinct; 2 praecoxal, 1 coxal, and 1 larger basal endite. Praecoxal and basal endites each with 2 plumose setae. Basal endite with strong, curved spine, coalescent with lobe; in addition, there is a seta. Endopodite almost completely reduced and represented by 4 setae at base of spine.

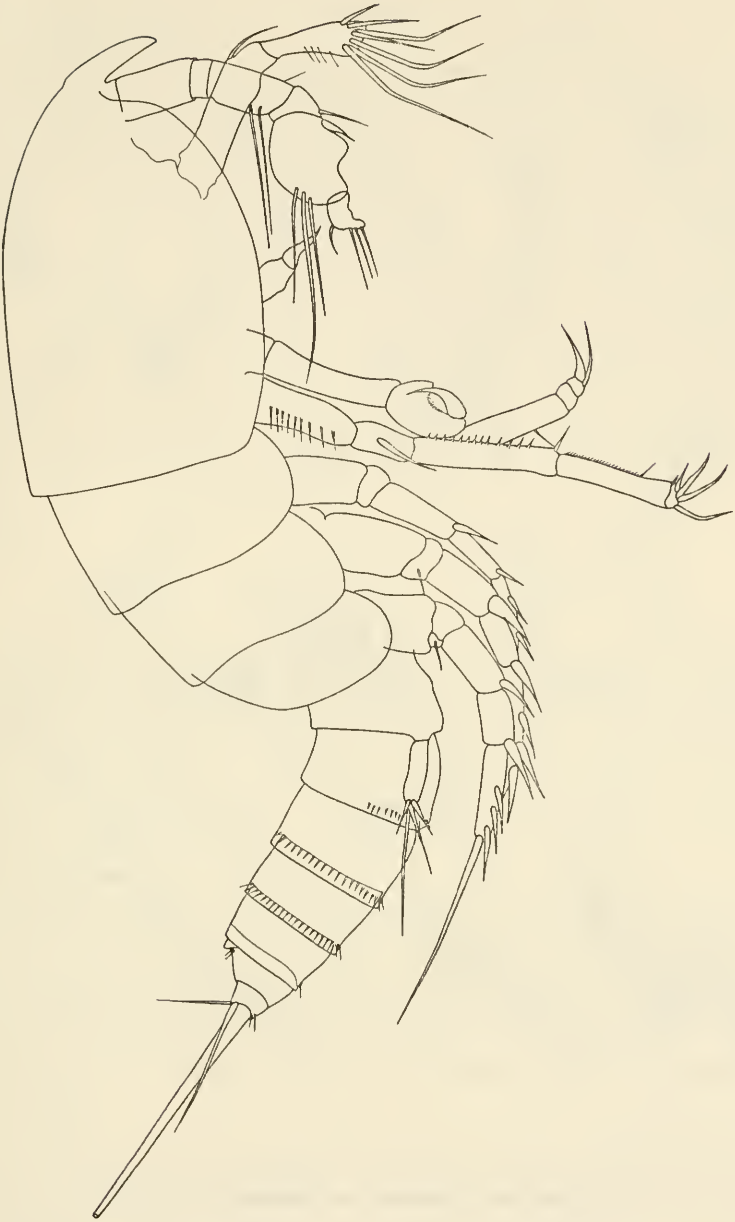

Figure 24.—*Harpacticus clausi* A. Scott, loc. 425, ad. ♂: whole animal, lateral view from right side. (× 250.)

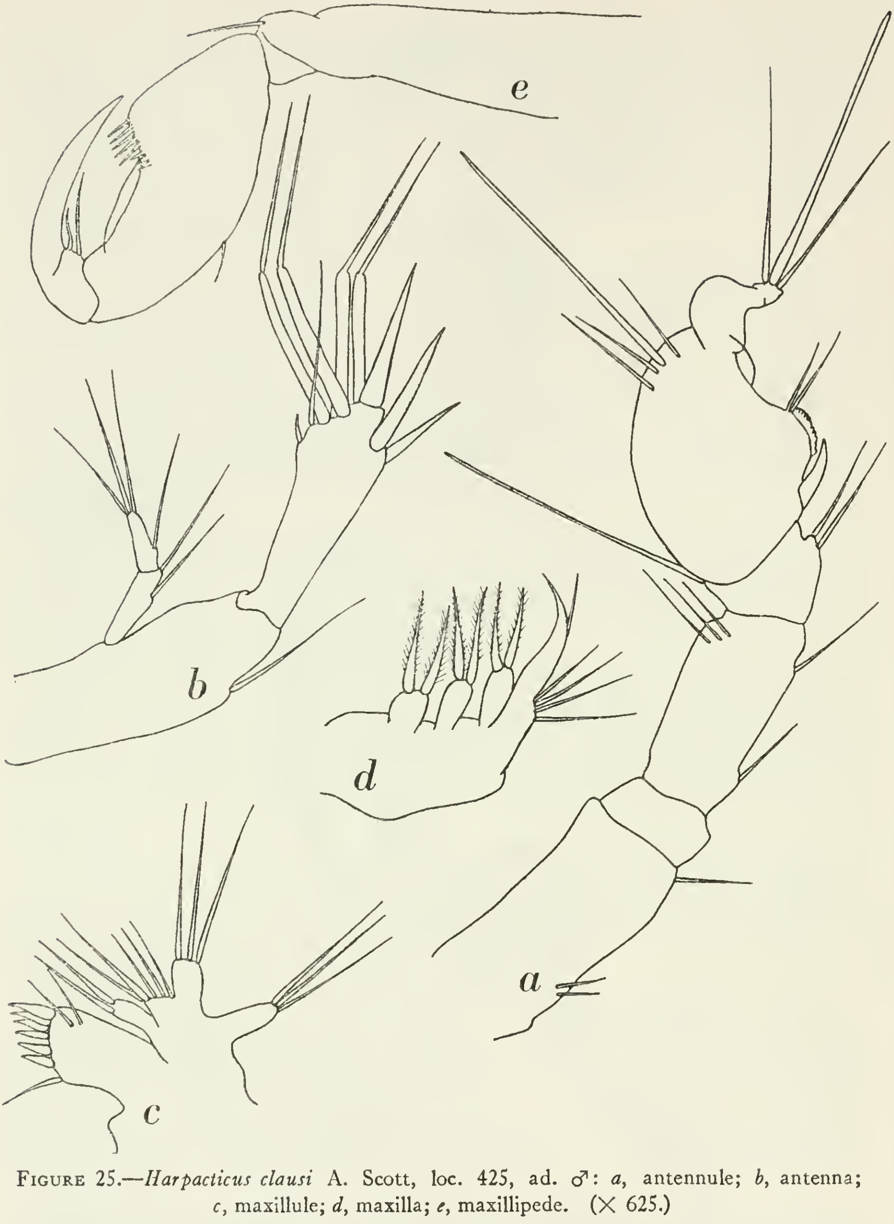

FIGURE 25.—*Harpacticus clausi* A. Scott, loc. 425, ad. ♂: *a*, antennule; *b*, antenna; *c*, maxillule; *d*, maxilla; *e*, maxillipede. (× 625.)

Maxillipede (fig. 25*e*) with long and slender coxa, bearing subapical seta. Basis large and swollen, with deeply concave internal border with transverse row of spines, and seta at middle of external border. Endopodite represented by curved, pointed digit, ⅔ length of basis, apparently composed of 2 fused segments. Near place of fusion two fine setae insert.

Leg 1 (fig. 26*a*) with strongly developed coxa and basis and 3-segmented endopodites and exopodites. Coxa spinulose at external border; basis with strong, external spine and slenderer internal spine; internal margin spinulose. 1st and 2nd exopodal segments long and styliform; 1st segment slightly longer than 2nd, external margin spinulose, with spiniform seta near its end. 2nd segment with seta at ⅔ of external margin. 3rd exopodal segment notably small, almost completely telescoped into 2nd, bearing 4 curved spines and fine seta. Endopodite styliform, 1st segment as long as 1st exopodal segment, upper part of internal margin spinulose and with fine seta at end of that margin. 2nd and 3rd endopodal segments small and of equal size; 2nd with small internal seta, 3rd with 2 big claws.

The details of legs 2 to 4 appear from figures 26*b*–*d*, the setal formula, and the following notes. Setal formula:

	endopodite	*exopodite*
leg 2	1.1.4 (modified)	1.1.223
leg 3	1.1.321	1.1.323
leg 4	1.1.321	1.1.221

Leg 2 (fig. 26*b*) with modified endopodite. 1st endopodal segment slightly more than twice as long as broad, reaching half 2nd exopodal segment, with 1 internal seta. External margin of 2nd endopodal segment drawn out to a long point; segment itself about as long as maximal width; point reaches beyond apex of exopodite and twice as long as segment itself; 1 internal seta. 3rd endopodal segment about half length of spiniform process, with 4 setae.

Exopodite of leg 3 modified (fig. 26*c*). 1st exopodal segment with distinct tooth halfway along external margin, in addition to spine at end of margin. Spines at external margin of segments 1, 2, and 3 of exopodite of increased size, especially those on 3rd segment. Apical spine on 3rd exopodal segment accompanied by seta, while 3 setae along internal margin. 3 spines on anterior aspect of 2nd endopodal segment. 2nd exopodal segment not lengthened, about 1½ times as long as wide.

Leg 4 with 3 spines on anterior aspect of 2nd endopodal segment (fig. 26*d*).

Leg 5 with greatly reduced baso-endopodite. Externally there is a slightly produced part with a fine seta and some spinules; there are no internal spines or setae. Exopodite 3 times as long as wide, cylindrical, with 4, strong, marginal, almost apical, spiniform setae and an extremely thin internal seta. Some dispersed spines along internal and external borders (fig. 26*e*).

REMARKS.—This male specimen agrees perfectly with Sewell's description of the male of *H. clausi* A. Scott. The only point in which there is a difference is the armature of the 2nd endopodal segment of leg 3; Sewell figures no spines on the anterior aspect, whereas three distinct spines are present on that segment in the present specimen (and on the corresponding segment of leg 4 in Sewell's and my own specimen). The agreement in the shape and armature of leg 5 is very striking. Because of the occurrence of spines on the endopodal segments of legs 3 and 4 the species might be confused with *H. obscurus*, a species found so far only in the North Atlantic. In *H. obscurus*, short, coarse spinules are present on both 1st and 2nd endopodal segments of legs 3 and 4 (in *H. clausi* there are fine, slender spinules on endopodal segment 2 of legs 3 and 4 and apparently only in the male). The difference in the shape of the exopodite of leg 5 is very striking: club-shaped in *H. obscurus* and almost cylindrical and much longer in *H. clausi*.

A single female specimen of this form was described by A. Scott from material collected by the Siboga Expedition at the surface near the Paternoster Islands (♀ 0.67 mm. long); this specimen, the holotype, apparently is lost. Additional female and male specimens afterwards were recorded from Nancowry Harbour in the Nicobar Islands by Sewell (1940) and shortly were described and figured. The female and the males measured 0.6 mm.; they were obtained in weed washings. The present male specimen was obtained from the reef edge south of Elangelap in the Ifaluk Atoll, where it occurred in 3 to 4 feet of water.

Harpacticus confusus, new species

FIGURES 27–30

MATERIAL.—Loc. 425, 3 ad. ♀♀, 0.37–0.39 (0.38) mm.; 1 ad. ♂, 0.35 mm.

DESCRIPTION.—The following is based on a 0.39 mm. long female (holotype), which has been dissected and mounted; the male allotype also has been described, dissected, and mounted. The two remaining specimens of the type lot are tubed as paratypes.

Adult female, total length 0.39 mm.; greatest diameter 0.11 mm.; length of longest furcal seta 0.23 mm.

General shape of body in dorsal aspect fairly slender, greatest diameter at 2nd thoracic somite, anteriorly slightly tapering and rounded; posteriorly very gradually tapering, division between cephalothorax and abdomen marked by distinct constriction (fig. 27*b*). Head and 1st thoracic somite fused to form cephalic somite, which is much longer (4:3) than combined lengths of thoracic somites 2 to 4; in dorsal aspect, anteriorly rounded, rostral base visible as small

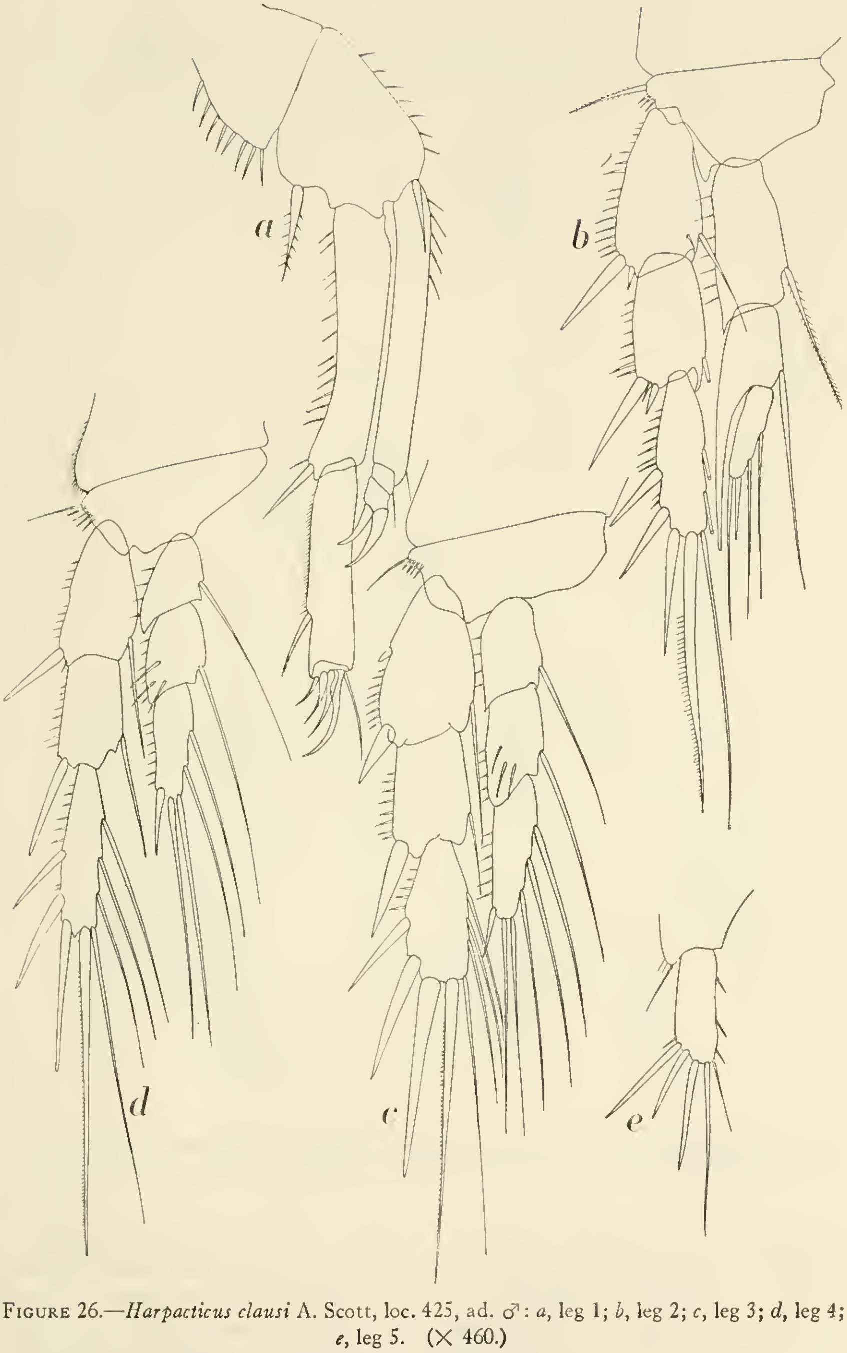

FIGURE 26.—*Harpacticus clausi* A. Scott, loc. 425, ad. ♂: *a*, leg 1; *b*, leg 2; *c*, leg 3; *d*, leg 4; *e*, leg 5. (× 460.)

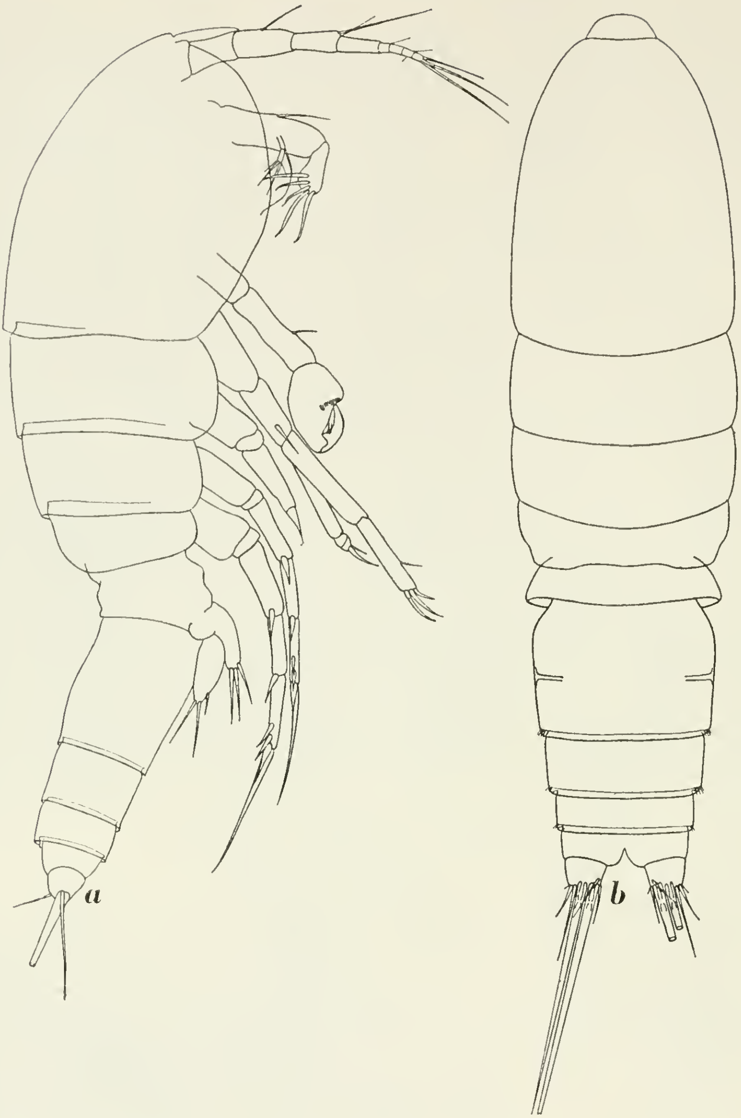

FIGURE 27.—*Harpacticus confusus*, new species, loc. 425, ad. ♀, holotype: *a*, whole animal, lateral view from right side; *b*, same animal, dorsal view. (× 275.)

rounded part in front of cephalic somite. In lateral aspect back slightly and smoothly curved (fig. 27*a*); rostrum separated from cephalic somite by distinct groove, curved, pointing forward and slightly downward. Lateral parts of cephalic somite produced to cover basal parts of oral appendages. Rostrum as long as 1st antennular segment, rounded at apex. Proportional length of cephalothorax and abdomen is 17:9. Thoracic somites 2 and 3 of about same length, epimeral plates well developed and rounded. 4th thoracic somite shorter, in dorsal aspect cut off squarely at distal end. 5th thoracic somite prominent both dorsally and laterally, in dorsal view much wider than genital somite.

1st and 2nd abdominal somites fused to form barrel-shaped genital somite; line of fusion visible in lateral and dorsal aspect. In dorsal aspect genital somite appears to be slightly swollen laterally and 1½

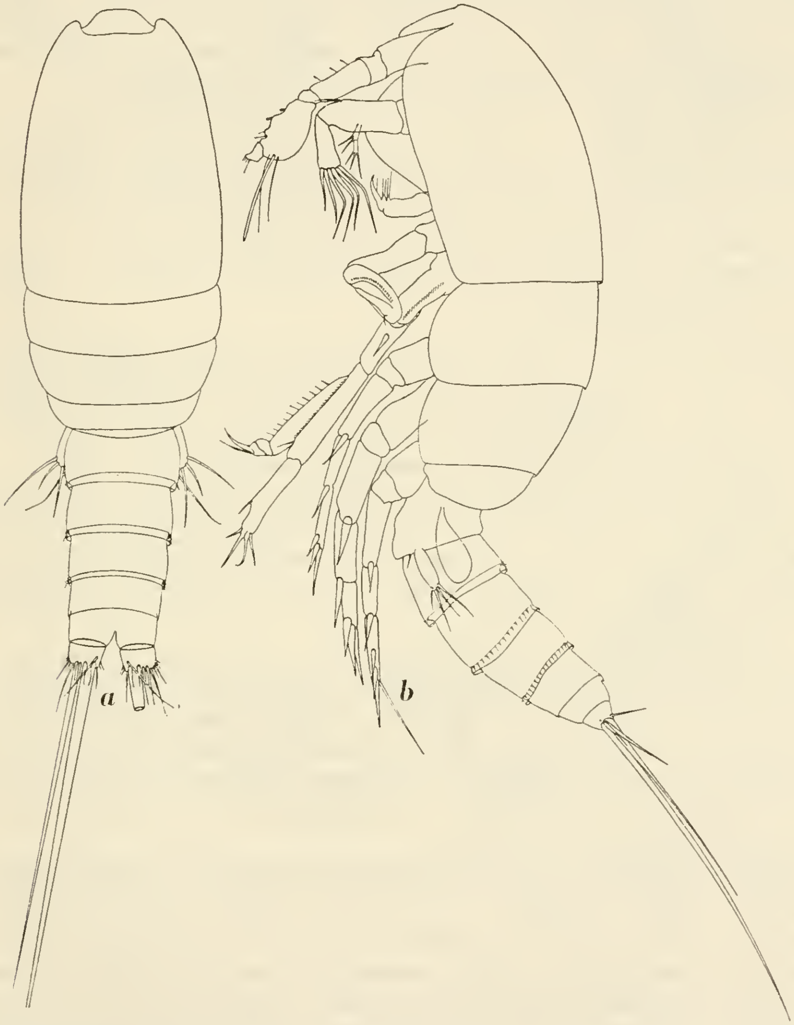

Figure 28.—*Harpacticus confusus*, new species, loc. 425, ad. ♂, allotype: *a*, whole animal, dorsal view; *b*, same animal, lateral view from left side. (× 210.)

times wider than long. Length of genital somite 1⅓ the combined lengths of abdominal somites 3 and 4; 4th abdominal somite half as long as 3rd. Some fine spinules occur on distal part of dorsolateral wall of abdominal somites 1+2, 3, and 4. Anal somite short, strongly telescoped into 4th; anal flap visible in lateral aspect (under distal wall of 4th somite) but invisible in dorsal aspect.

Furcal rami slightly diverging, distinctly broader than long (proportion 5:3), with 5 marginal setae and 1 appendicular seta each. Setae 1, 4, 5, and appendicular seta short, 4th twice as long as 1 and 5. Setae 2 and 3 lengthened and thickened, especially 2nd, which reaches ⅗ body length. Setae 2 and 3 not swollen basally. Some fine spinules occur at the internal and external furcal borders.

Antennules (fig. 29*a*) slender, ⅔ length of cephalic somite, 9-segmented; segments 1 to 4 of nearly same length, long, segment 4 with small, conical process bearing aesthetasc and 2 setae. Segments 5 to 9 short. Setation of antennule represented in figure 29*a*.

Antenna (fig. 29*b*) of normal type, without pectinate spines. Exopodite 2-segmented, with 2 and 4 setae respectively; endopodite with 3 spines and 4 geniculate setae.

Praecoxa of mandible with well-developed cutting edge, bearing 5 teeth and basal seta. Palp well shaped, basis and coxa fused, large, with 4 short setae. Endopodite and exopodite styliform, without segmentation, exopodite with 3, endopodite with 6 setae (fig. 29*c*).

No suitable preparation of the maxillule was obtained.

Maxilla (fig. 29*d*) with 4 endites: 2 praecoxal and only coxal endite small, each with 2 short setae. Basal endite better developed, armed with large, curved spine, coalescent with endite, and fine seta. Endopodite almost completely reduced and represented by 3 fine setae on basal endite.

Maxillipede (fig. 29*e*) strongly developed, chelate. Coxa elongate, without setae. Basis strongly swollen, deeply incised to form square notch, with oblique row of spinules. Digit curved, acutely pointed, ⅔ length of basis, formed by two fused endopodal segments; line of fusion almost obliterated. I failed to observe additional setae on the digit, near the fusion of both segments, as is frequently seen in other species of *Harpacticus*.

Coxa and basis of leg 1 (fig. 30*a*) well developed; external border of coxa swollen, spinulose. Basis with strong, spinulose seta at external margin and much smaller seta on internal margin near insertion of endopodite. Both endopodites and exopodites 3-segmented. Segments 1 and 2 of exopodite elongate, of nearly same length, both with subapical, short seta; 1st with haired external margin. Apical segment very small, almost completely telescoped into 2nd, bearing 4 appendages: 3 curved claws and a spiniform seta.

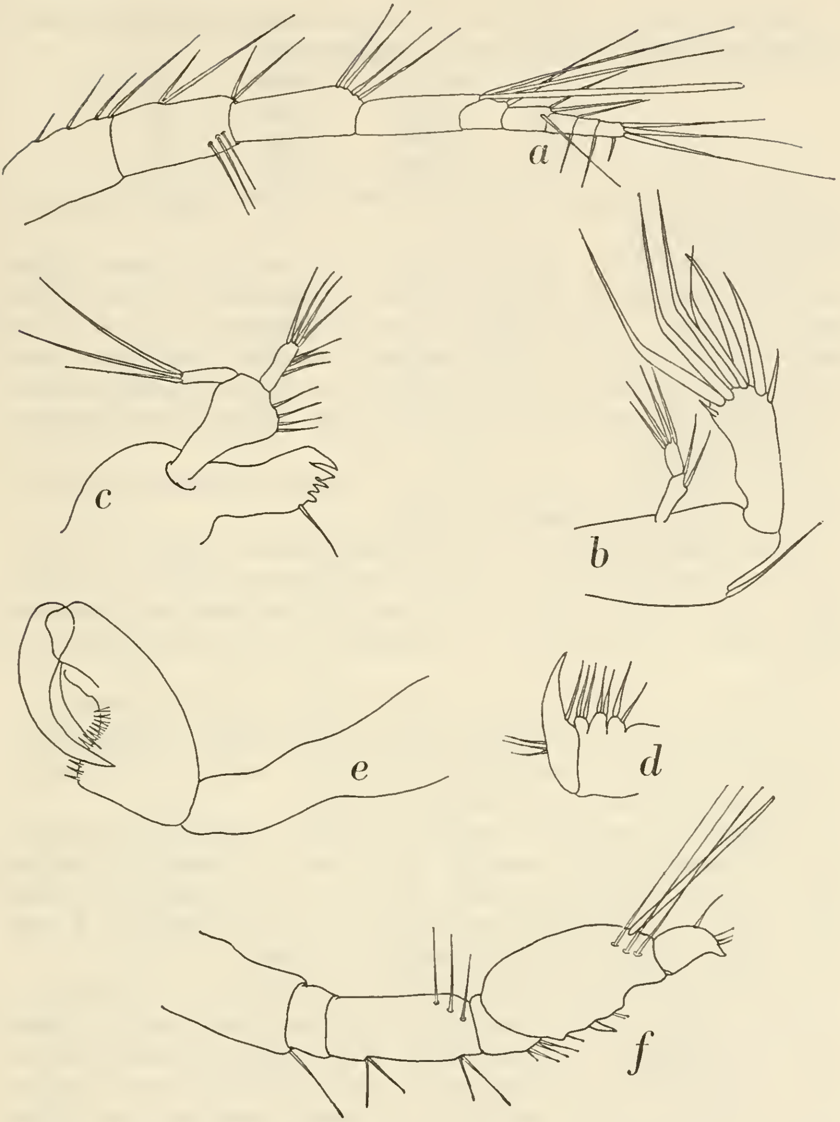

FIGURE 29.—*Harpacticus confusus*, new species, loc. 425, ad. ♀, holotype: *a*, antennule; *b*, antenna; *c*, mandible; *d*, maxilla; *e*, maxillipede; ad. ♂, allotype: *f*, antennule. (× 625.)

1st endopodal segment as long as corresponding segment of exopodite, styliform, external margin haired, internal margin with subapical seta. Segments 2 and 3 small, of about equal size, 3rd with slender, curved spine and hooked seta.

The particulars of legs 2 to 4 follow from figures 30*b–d*, the setal formula, and the following notes. Setal formula:

	endopodite	*exopodite*
leg 2	1.1.221	1.1.223
leg 3	1.1.321	1.1.323
leg 4	1.1.221	1.1.323

There is only 1 seta at the internal border of 2nd endopodal segment of leg 2 (fig. 30*b*).

Exopodite of leg 5 (fig. 30*e*) ovate, twice as long as broad, apex slightly narrowing. 5 marginal setae: 3 external, 1 (long) apical, and 1 internal. External lobe of baso-endopodite small, with fine seta. Baso-endopodite well produced, reaching slightly beyond middle of exopodite, with 3 marginal setae, internal seta spinulose.

The holotype carried a sac with 9 eggs. Color faded, greenish; no eyespot visible.

Adult male, total length 0.35 mm.; greatest diameter 0.10 mm.; length of longest furcal seta 0.33 mm.

General shape of body as in female, proportional length of cephalothorax and abdomen is 15:8. Male body, however, slightly slenderer, with the result that division between cephalothorax and abdomen more distinct (figures 28*a*,*b*). Male differs from female in following points:

1. Body, at least in present specimen, more strongly curved, with the result that, in dorsal view, 4th thoracic somite visible only as very narrow strip behind broad 3rd thoracic somite. 5th thoracic somite in dorsal view even smaller (fig. 28*a*).

2. Rostrum directed downward and slightly backward, less curved than in female; in dorsal aspect placed in distinct depression of cephalic somite, only base being visible. Both in the lateral and dorsal aspect there is a considerable difference between female and male as far as the structure of the rostrum is concerned.

3. Abdomen composed of 5th thoracic somite and 5 abdominal somites. Fine spinules occur as completely closed ring at distal end of 1st abdominal somite, while much coarser spinules occur at distal ends of 2nd and 3rd thoracic somites. Anal somite as in female, flap invisible. Furcal rami distinctly broader than long (proportion 3 to 2), ornamentation as in female. Small spermatophore visible in 1st abdominal somite.

4. Antennules chirocerate, slightly exceeding length of cephalic somite. Segments 1 and 3 long, 2 and 4 short. 5th segment swollen, with aesthetasc. Apical segment small, obtusely pointed. Setation represented in figure 29*f*; in addition to setae and aesthetasc, 5th segment has small tooth at internal margin.

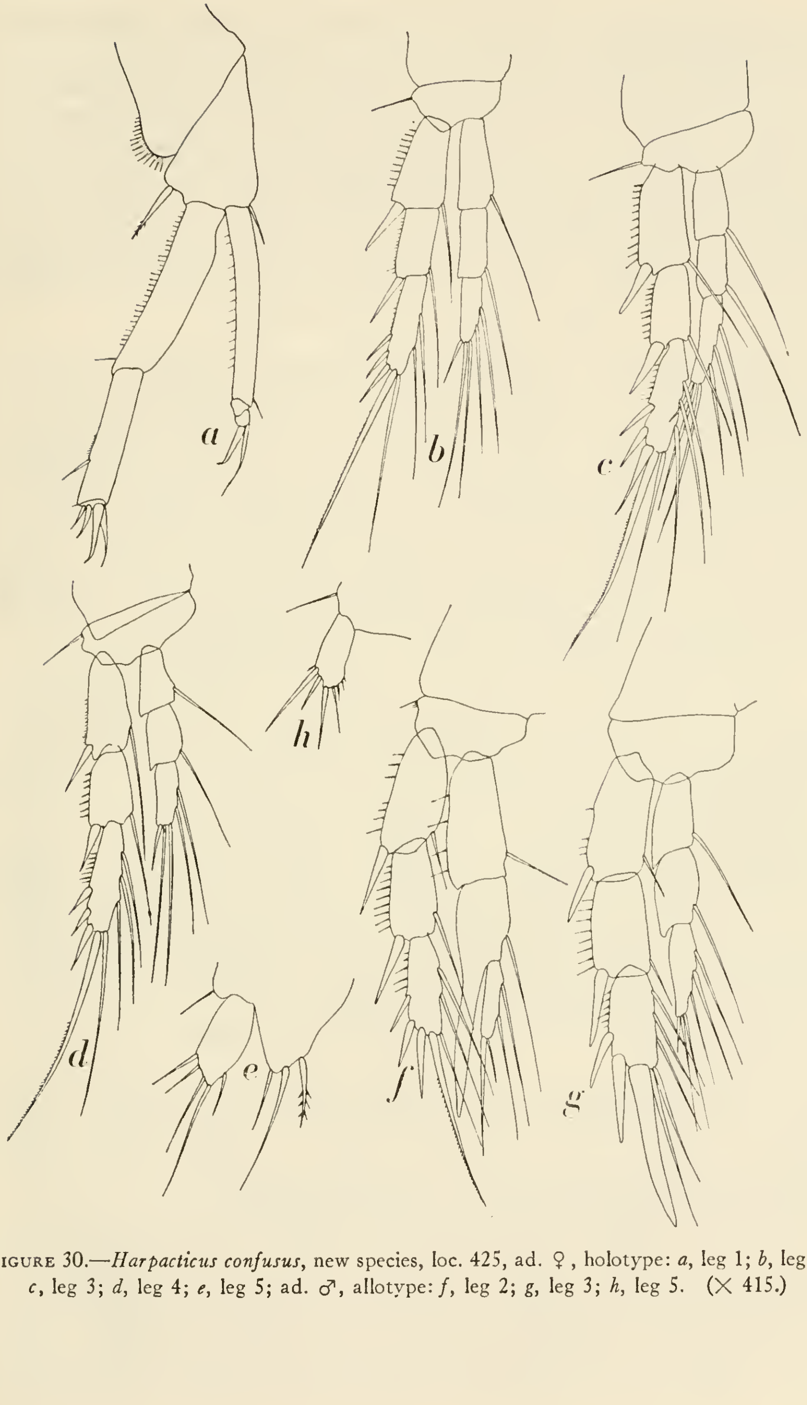

FIGURE 30.—*Harpacticus confusus*, new species, loc. 425, ad. ♀, holotype: *a*, leg 1; *b*, leg 2; *c*, leg 3; *d*, leg 4; *e*, leg 5; ad. ♂, allotype: *f*, leg 2; *g*, leg 3; *h*, leg 5. (× 415.)

5. Antenna with slightly stronger exopodite, made up of 4 distinctly jointed segments.

6. Legs 1 and 4 as in the female. Leg 2 (fig. 30*f*) with more strongly developed exopodite and modified endopodite. Segments of exopodite of leg 2 broader and external marginal spines stronger; 3 segments about same length. 1st endopodal segment reaches middle of 2nd exopodal segment; external apex of 2nd endopodal segment drawn out to long, pointed process, twice as long as segment itself and reaching far beyond apex of exopodite. 1st and 2nd endopodal segments each with internal seta; 3rd endopodal segment small, with 4 setae.

Leg 3 (fig. 30*g*) with strongly developed exopodite; endopodite, reaching half 3rd exopodal segment, as in female. Segments of exopodite, compared with condition found in female, longer and broader, of nearly same length. External marginal spines strongly developed; 1st and 2nd exopodal segments each with 1 spine, 3rd exopodal segment with 3 spines, gradually increasing in size; 3rd spine particularly big, apical, 1½ times as long as 3rd segment. Usual apical spine on 3rd exopodal segment thin and slender, with accompanying seta pressed aside by 3rd outer edge spine. In addition, there are 3 setae at the internal margin of the 3rd segment.

Leg 5 (fig. 30*h*) with small external lobe of baso-endopodite; no internal setae occur. Exopodite squarish, twice as long as broad. There are 3 spiniform setae and 2 or 3 fine internal setae, gradually merging into dispersed, hairlike spinules of internal margin. External margin with small spinule above superior seta.

REMARKS.—The present new species undoubtedly is allied closely to *Harpacticus trisetosus* Lang, 1948, which was based on a single female specimen from the *Siboga* Expedition (Paternoster Islands) which in turn, was described by A. Scott (1909, p. 202, pl. 61, figs. 15–21) as *H. glaber*. The following points of difference between the females of both species have been noted:

1. *H. trisetosus* measured 0.56 mm.; the present specimens are 0.37–0.39 mm.

2. In *H. trisetosus* the 1st exopodal segment of the antenna has a single seta; there are two in *H. confusus*, but in A. Scott's figure a basally inserting seta on the 2nd exopodal segment of the antenna may in reality belong to the 1st exopodal segment.

3. There are slight differences in the shape of the maxillipede, e.g., the absence of setae on the endopodite in *H. confusus;* such setae are clearly figured by A. Scott. The general shape of the basis seems to agree although the notch is more squarely cut in *H. confusus*.

4. No details of legs 1 to 4 can be lifted from A. Scott's description and figures, but the shape of leg 5 seems to agree quite well. I

scarcely can suppose, however, that A. Scott overlooked the very characteristic spinulose internal seta on the baso-endopodite; part of the differences mentioned above may be due to incorrectnesses in A. Scott's drawings, faults of preparation, or, as far as the maxillipede is concerned, angle of vision.

The present specimens are all from weed washings off the edge of the élang, south of Elangalap, Ifaluk Atoll, in 3 to 4 feet of water. The specific name *confusus* has been suggested by their confusing resemblance to *H. trisetosus* Lang.

Genus *Perissocope* Brady, 1910

The discovery of the male of a new species of *Perissocope*, to be described below, makes it possible to give a more complete diagnosis of this genus.

GENERIC DIAGNOSIS.—Body in dorsal aspect elongated, frontal part rounded, cephalic somite smooth or longitudinally carinated, rostrum squarish plate with broadly rounded apex, distinctly visible in dorsal aspect, directed forward and slightly downward. Body fairly strongly compressed dorsoventrally, gradually tapering posteriorly, epimeral plates well developed, produced laterocaudally, without sharp division between cephalothorax and abdomen, head and 1st thoracic somite fused.

Females with 8- or 9-segmented antennules, basal 4 segments long, apical 4 or 5 segments short. Antenna with allobasis, endopodite 1-segmented, with 8 setae and spines, exopodite 2-segmented, with 2+2 setae. Exopodite and endopodite of mandible unsegmented, small. Structure of maxillule unknown. Maxilla with 3 endites and unsegmented endopodite. Maxillipede chelate, coxa of moderate length, basis slightly swollen and endopodite unsegmented.

Leg 1 with 3-segmented exopodite and 2-segmented endopodite, coxa and basis well developed. 1st exopodal segment well developed, 2nd segment styliform, twice as long as 1st, both with external seta. 3rd exopodal segment short with 4 claws. 1st endopodal segment long, reaching about half 2nd exopodal segment, with strong internal seta at upper portion of external margin. 2nd endopodal segment small, with 2 claws.

Legs 2 to 4 with 3-segmented exopodites and endopodites, setation as represented in setal formula on page 100; 3rd exopodal segment of legs 2 and 3 with 3 spines at external margin, 3rd exopodal segment of 4th leg with 2 or 3 external marginal spines.

Leg 5 with distinct, ovate exopodite, bearing 5 to 7 setae or setiform spines. Baso-endopodite with at least 5 setae, well developed; external lobe small, with fine seta.

Males differ from females in following points: Antennules 8- to 9-segmented, subchirocerate, 5th segment strongly swollen, with aesthetasc, apical 3 or 4 segments fused. Endopodites of legs 2 and 3 modified, though still 3-segmented. 2nd endopodal segment of leg 2 drawn out to sharp point, reaching half length of 3rd endopodal segment, 1 internal seta. 3rd endopodal segment of leg 2 also drawn out to point, bifid at apex, with 2 internal setae. 2nd endopodal segment of leg 3 with spiniform process at internal part of apex, fitting into depressed part of 3rd endopodal segment; 2nd endopodal segment with 1 internal; 3rd with total of 6 setae. Exopodite of leg 5 almost as in female, number of setae not reduced. Only 2 setae occur on the much shorter baso-endopodite.

Type species: *Perissocope typicus* Brady 1910 (=*Harpacticus simplex* Brady, 1910).

Further species: *Harpacticus cristatus* A. Scott, 1909; *H. xenus* Monard, 1926, *Perissocope littoralis* Lang, 1934, and *P. bayeri*, new species, to be described below.

Key to the Females of *Perissocope*

1. Cephalic somite longitudinally carinated; of the setae on the exopodite of leg 5 (5 in all) two are broadened, dagger-shaped . . . **P. cristatus** (A. Scott)
   Cephalic somite smooth; all setae on the exopodite of leg 5 (numbering 5 to 7) are normally developed and slender 2
2. Exopodite of leg 5 with 7 setae . . . . **P. typicus** Brady
   Exopodite of leg 5 with 5 or 6 setae 3
3. 3rd exopodal segment of leg 4 with 2 spines at external margin; setae on exopodite of leg 5 number 5 . . . . **P. bayeri**, new species
   3rd exopodal segment of leg 4 with 3 spines at external margin; setae on exopodite of leg 5 number 6 4
4. Terminal segment of exopodite legs 3 and 4 with 2 internal setae, total number of appendages on these segments 7 . . . . **P. xenus** (Monard)
   Terminal segment of exopodite legs 3 and 4 with 3 internal setae, total number of appendages on these segments 8 . . . . **P. littoralis** Lang

***Perissocope bayeri*, new species**

FIGURES 31–33

MATERIAL.—Loc. 589, 4 ad. ♀♀, 0.27–0.32 mm. (0.29 mm.); 1 ad. ♂, 0.29 mm.

DESCRIPTION.—The following has been taken from an adult, ovigerous female, 0.30 mm. length (holotype), which has been dissected and mounted. The male allotype also has been dissected and mounted. The remaining three females have been labelled as paratypes.

Adult female, total length 0.30 mm.; maximal diameter 0.11 mm.; length of longest furcal seta 0.12 mm.

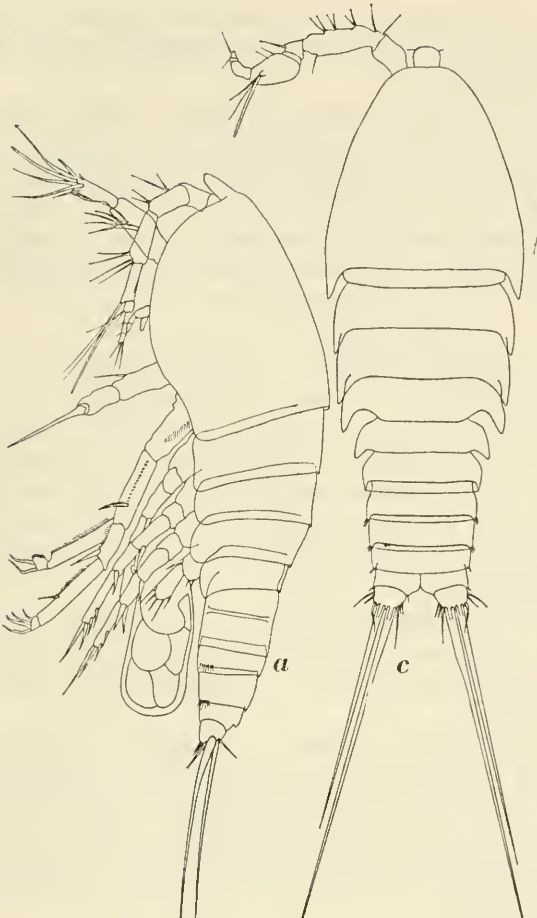

Figure 31.—*Perissocope bayeri*, new species, loc. 589, ad. ♀, holotype: *a*, whole animal, lateral view from left side; *b*, same animal, dorsal view; ad. ♂, allotype: *c*, whole animal, dorsal view. (× 250.)

Body moderately but distinctly depressed dorsoventrally, spindle-shaped in dorsal aspect, without distinct division between cephalothorax and abdomen, greatest diameter at end of cephalic somite, rounded anteriorly and very gradually tapering posteriorly (fig. 31*b*). Head and 1st thoracic somite completely fused to form cephalic somite, which is as long as combined lengths of thoracic somites 2 to 5. Rostral plate and part of rostrum distinctly visible from above as rounded tubercle on front of head; in lateral aspect rostrum fairly small, rounded at apex and directed forward and slightly downward. Two fine hairs of frontal organ clearly visible. Thoracic somites 2 and 3, and 4 and 5, of same length. Epimeral plates, especially of 4th and 5th thoracic somites, well developed, laterally and backwardly produced, rounded (fig. 31*a*).

Genital somite composed of fused abdominal somites 1 and 2; line of fusion very distinct on lateral and dorsal surfaces. Some hairs or spinules occur laterally at distal margin of genital somite, which is about twice as broad as long. Abdominal somites 3 and 4 of about same length, strongly telescoped, both somites with some ventrolateral spinules at distal margin. Anal somite about as long as somite 3 or 4, anal flap slightly rounded, almost straight, without hairs or spinules.

Caudal rami twice as broad as long. 5 marginal setae and 1 appendicular seta on each ramus. Setae 1, 4, 5, and appendicular seta fine and short, seta 5 placed at external furcal border almost near insertion of furca on anal somite. Setae 2 and 3 lengthened and thickened, especially seta 2, which reaches ⅓ body length and is slightly swollen basally. In addition, there are some fine spinules along the internal and external furcal border, the position of which can be judged best from figure 31*b*.

Antennules ⅔ length of cephalic somite, 8-segmented, basal 4 segments large, apical 4 segments small. 4th segment with small conical process, carrying aesthetasc and 2 setae. Setation of whole antennule represented in figure 32*a*.

Antenna (fig. 32*b*) with allobasis and small endopodite, carrying a total of 8 appendages: 5 geniculate setae and 3 spines. Exopodite styliform, fairly long, 2-segmented, each segment with 2 setae. The position of the apical seta suggests that more setae had been present but had been removed during preparation; the condition described, however, prevails on both sides.

Cutting edge of mandibular praecoxa well developed, bearing 6 sharp teeth and basal seta. Basipodite triangular, with 3 setae. Exopodite styliform, with 2 setae. Endopodite unsegmented, with 1 lateral and 3 apical setae (fig. 32*c*).

I failed to obtain a satisfactory preparation of the maxillulae.

Maxilla (fig. 32*d*) with 3 endites; praecoxal and coxal endite small, each with 2 setae. Basal endite slightly bigger, with strong coalescent spine and fine seta. Endopodite represented by single, unsegmented lobe, bearing 3 setae.

Coxa of maxillipede (fig. 32*e*) with strong, setose internal seta, part of external margin haired. Basis 3 times as long as wide, internal border with single fine seta, external border slightly swollen. Endopodite reduced to form single, slightly curved digit, as long as basis and without setae.

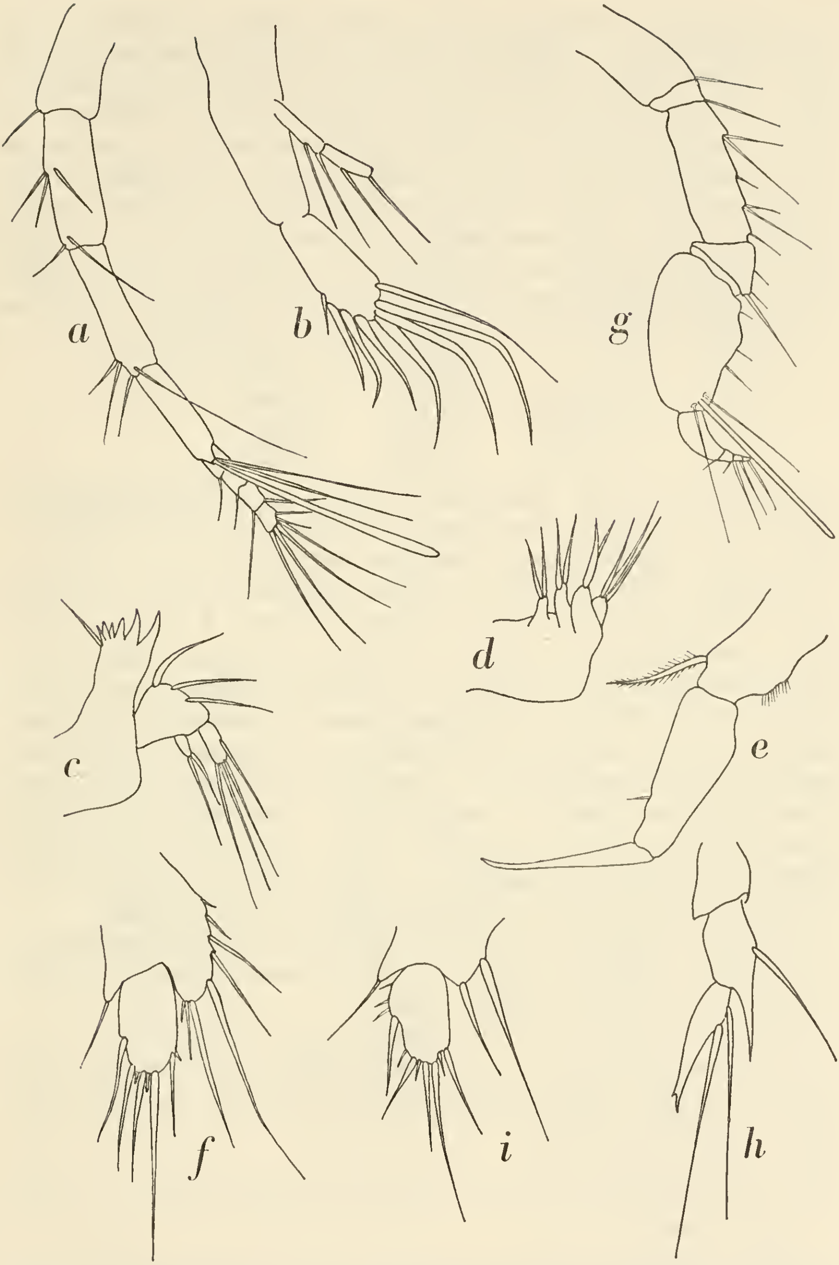

FIGURE 32.—*Perissocope bayeri*, new species, loc. 589, ad. ♀, holotype: *a*, antennule; *b*, antenna; *c*, mandible; *d*, maxilla; *e*, maxillipede; *f*, leg 5; ad. ♂, allotype: *g*, antennule; *h*, endopodite of leg 2; *i*, leg 5. (× 625.)

Leg 1 (fig. 33*a*) with coxa haired, external margin of basis spinulose, with subapical seta. Exopodite 3-segmented, endopodite 2-segmented. 1st exopodal segment half as long as 2nd, external margin haired and with subapical seta. 2nd exopodal segment styliform, nude; external seta occurs at ¾ the margin and a small internal seta at end of internal margin. 3rd exopodal segment small, with 4 hooked spines. 1st endopodal segment styliform, reaching half length of 2nd exopodal segment, with strong seta nearly at beginning of internal margin. 2nd endopodal segment small, with 2 claw-shaped spines at the apex.

The particulars of legs 2 to 4 may appear from figures 33*b–d*, from the setal formula, and from the following notes. Setal formula:

	endopodite	*exopodite*
leg 2	0.1.221	0.1.223
leg 3	1.1.321	0.1.323
leg 4	1.1.221	0.1.322

External margin of exopodites of legs 2 to 4 strongly spinulose. 3rd exopodal segment of legs 2 and 3 with 3 spines at external margin; only 2 of such spines occur along that margin in leg 4.

Exopodite of leg 5 (fig. 32*f*) ovate, attached to baso-endopodite with broad base, about twice as long as broad. 5 marginal setae, 3 at external margin, 1 at apex, 1 at internal margin. In addition, there are some marginal spinules visible between basal parts of setae. 3 external setae of equal development, normally shaped. Apical seta lengthened, twice as long as remaining setae. External lobe of baso-endopodite small, with fine seta. Baso-endopodite reaches half length of exopodite and carries 5 marginal setae: 1 short seta at external border, 1 at apex, and 3 at internal border. In addition, there are two spinules at the internal margin, one reaching the size of a small seta. Shape and distribution of setae best judged from figure 32*f*.

The type specimen carried a single egg ball attached ventrally to the abdomen and containing 8 eggs. Color of preserved specimen transparently yellowish, no eyespot visible.

Adult male, total length 0.29 mm.; greatest diameter 0.11 mm.; longest furcal seta 0.15 mm. (This specimen could not be figured laterally because of the position of the antennules. It is, in lateral view, not greatly different from the female; the 5th and 6th feet could easily be observed.)

In the following points I have listed the principal differences between male and female:

1. Body of male slenderer; epimeral plates better developed, more caudally produced, in dorsal aspect presenting a different appearance from that of female (fig. 31*c*).

2. 5th thoracic somite less wide than abdominal somites 3 and 4, with the result that in male distinction between cephalothorax and

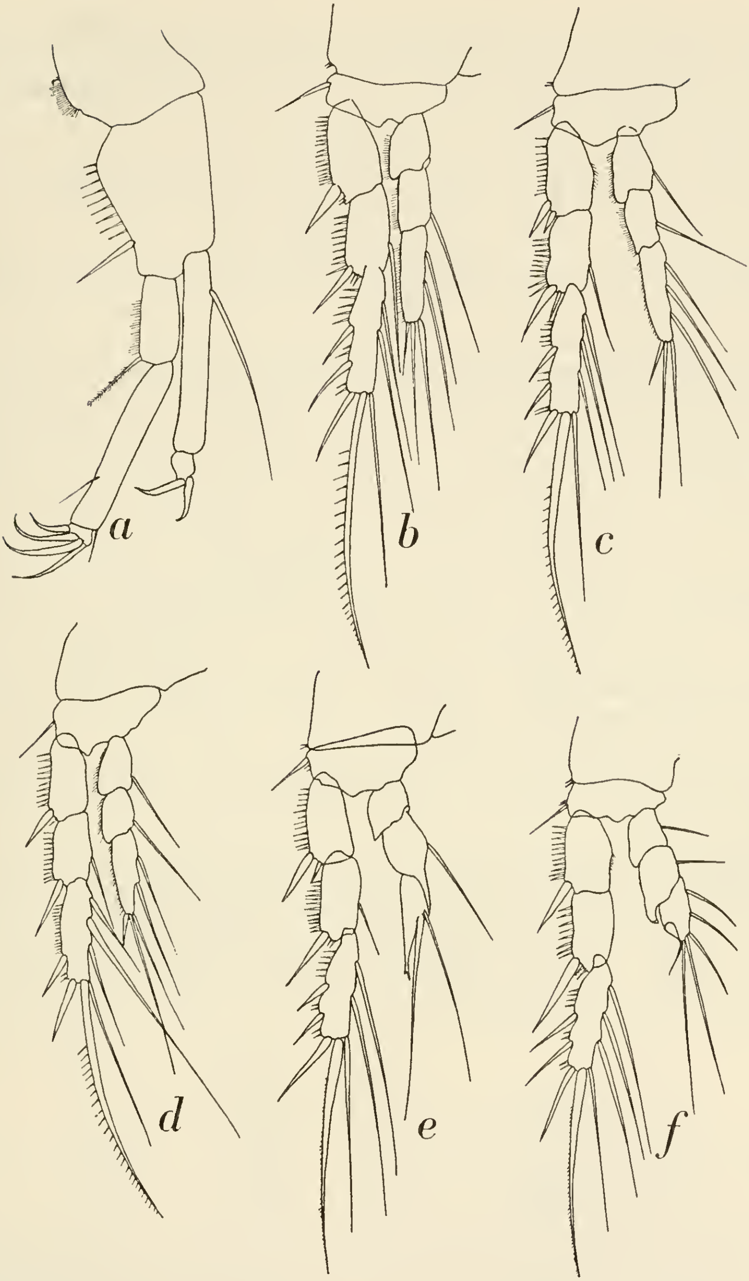

FIGURE 33.—*Perissocope bayeri*, new species, loc. 589, ad. ♀, holotype: *a*, leg 1; *b*, leg 2; *c*, leg 3; *d*, leg 4; ad. ♂, allotype: *e*, leg 2; *f*, leg 3. (× 520.)

abdomen better marked than in female. 1st and 2nd abdominal somites separate, each of about same length as 3rd abdominal somite. 4th abdominal somite and anal somite of equal length, each shorter than preceding somites.

3. Antennules (fig. 32*g*) subchirocerate, longer than in female, surpassing ⅔ length of cephalic somite. 5th segment swollen, with distinct aesthetasc and 2 setae. Apical digit formed by 4 indistinctly fused segments. I have represented the setation as well as possible in figure 32*g*, but some of the setae are very minute and others may have been overlooked. I failed to observe differences in the structure of oral appendages or antennae.

4. Legs 1 and 4 as in female, exopodites of legs 2 and 3 as in female, but endopodites of these legs modified. Endopodite of leg 2 (figs. 32*h*, 33*e*) 3-segmented: segment 1 normally built, without setae; segment 2 with internal seta, end of internal margin drawn out to a point, reaching half length of 3rd endopodal segment; latter segment elongate, gradually tapering into bifid point. Two internal setae: fine proximal seta and much thicker distal seta. Endopodite of leg 3 (fig. 33*f*) also 3-segmented. Segment 1 normal, with fine internal seta. Segment 2 with internal seta, external margin at apex running into short, curved spine, apparently fitting into hollowed part of 3rd endopodal segment, with 1 fine internal seta. Apical segment with total of 5 setae; more external seta very fine and small.

Leg 5 (fig. 32*i*) almost as in female, but with reduced number of setae on baso-endopodite. Exopodite with same number of identically developed setae. Baso-endopodite less produced, reaching only ¼ length of exopodite, with only 2 setae of unequal size.

Remarks.—This new species, which clearly belongs to the genus *Perissocope*, is closely related to *P. littoralis* Lang, from which it differs in the armature of legs 2 to 4 and in the structure of leg 5. The setal formula of those species of *Perissocope* that are adequately known have been tabulated below:

	P. xenus	*P. littoralis*	*P. bayeri*
leg 2, endopodite	0.1.221	0.1.221	0.1.221
leg 2, exopodite	0.1.223	0.1.223	0.1.223
leg 3, endopodite	1.1.321	1.0.321	1.1.321
leg 3, exopodite	0.1.223	0.1.323	0.1.323
leg 4, endopodite	0.1.221	1.1.221	1.1.221
leg 4, exopodite	0.1.223	0.1.323	0.1.322

The present specimens were obtained from sand samples, collected about 60 feet from the reef margin of the seaward side of Falarik in the Ifaluk Atoll. The specific name has been chosen in honor of Dr. Frederick M. Bayer, formerly Associate Curator, Division of Marine Invertebrates, U.S. National Museum, Washington, D.C., and now Research Associate Professor, Institute of Marine Science, University of Miami, who collected the specimen and who, in fact, collected most of the material described here. Of the remaining species of *Perissocope*, two, *P. typicus* and *P. cristatus*, appear to be pelagic, or at least temporarily pelagic; two, *P. xenus* and *P. littoralis*, are found in washings of algae from moderate depths.

Family Tisbidae Stebbing, 1910

Lang (1948) has suggested a subdivision of this family into two subfamilies, with the following genera:

Subfamily Tisbinae Stebbing, 1910: genera *Tisbe* Lilljeborg, 1853 (type species *Cyclops furcatus* Baird, 1837), *Scutellidium* Claus, 1866 (type species *Psamathe longicauda* Philippi, 1840), *Cholidya* Farran, 1914 (type species *C. polypi* Farran, 1914), *Sacodiscus* C. B. Wilson, 1924 (type species *Aspidiscus fasciatus* Norman, 1868), *Tisbella* Gurney, 1927 (type species *T. timsae* Gurney, 1927), and *Tisbintra* Sewell, 1940 (type species *T. nankaurica* Sewell, 1940).

Subfamily Idyanthinae Lang, 1944: genera *Zosime* Boeck, 1872 (type species *Z. typica* Boeck, 1872), *Idyella* G. O. Sars, 1905 (type species *I. pallidula* G. O. Sars, 1905), *Tachidiella* G. O. Sars, 1909 (type species *T. minuta* G. O. Sars, 1909), *Idyanthe* G. O. Sars, 1909 (type species *Idyopsis dilatata* G. O. Sars, 1905), *Pseudozosime* T. Scott, 1912 (type species *P. browni* T. Scott, 1912), *Idyellopsis* Lang, 1948 (type species *I. typica* Lang, 1948), and *Idyanthopsis* Bocquet and Božić, 1955 (type species *I. psammophila* Bocquet and Božić, 1955).

The genera *Phroso* Brady, 1899 (type species *P. gracilis* Brady, 1899), and *Metaphroso* Brady, 1910 (type species *M. gracilis* Brady, 1910) have been insufficiently characterized and consequently are of uncertain position. The genus *Paridya* Sewell, 1940, falls within the genus *Tisbe* as defined by Lang (1948, p. 364).

Representatives of two species of *Scutellidium* occur in the present collection.

Genus *Scutellidium* Claus, 1866

Since Lang's reviews (1936, 1948) of the genus *Scutellidium* Claus 1866 (=*Psamathe* Philippi, 1840; =*Machairopus* Brady, 1883), several new forms have been described. The following list shows the present position of this genus; the type species is *Psamathe longicauda* Philippi, 1840.

FEMALES	MALES
Psamathe longicauda Philippi, 1840	*P. longicauda* Philippi, 1840
(=*Scutellidium t(h)isboides* Claus, 1866; *P. sargassi* G. O. Sars, 1916)	
Canthocamptus? hippolytes Krøyer, 1863	*C. hippolytes* Krøyer, 1863
(=*Machairopus minutus* G. O. Sars, 1905; *Machaeropus minutus* Marine Biological Association, 1957)	
Machairopus idyoides Brady, 1883	
Scutellidium arthuri Poppe, 1884	*S. arthuri* Poppe, 1884
S. a. var. *magnum* Monk, 1941	
S. plumosum Brady, 1899a	*S. plumosum* Brady, 1899a
M. lenticularis Brady, 1910	
(=*M. kerguelensis* Brady, 1910, in explanation of figure)	
P. fucicola T. Scott, 1912	
M. australis T. Scott, 1912	*M. australis* T. Scott, 1912
(=*Machairopus karletzi* Pesta, 1928)	
M. major T. Scott, 1912	
Idya ligustica Brian, 1920	*I. ligustica* Brian, 1920
(=*P. machairopoides* Monard, 1928)	
S. antarcticum Lang, 1936c	
S. purpurocincta Monk, 1941	
S. lamellipes Monk, 1941	*S. lamellipes* Monk, 1941
M. intermedius Nicholls, 1941	*M. intermedius* Nicholls, 1941
M. cockburni Fairbridge, 1944	
S. loureiroi Jakobi, 1954	

The position of the following species is uncertain:

M. digitatus Brady, 1910	*M. digitatus* Brady, 1910
M. sarsi Brady, 1910	
Machairopus sanctaecrucis I. C. Thompson, 1888 (probably a calanoid copepod)	

A new species will be described below as:

Scutellidium dentipes, new species

Of the species listed above some are insufficiently known and may on closer examination, turn out to be identical with older forms. *Scutellidium arthuri*, *S. arthuri* var. *magnum*, *S. purpurocincta* and the new species *S. dentipes* form a complex which, after the study of more material, may well appear to represent one somewhat variable species. *S. cockburni* is very closely allied to *S. australe*, and *S. loureiroi* differs from *S. longicauda* in minor particulars only. The following keys may serve to distinguish the females and males.

Key to the Species of *Scutellidium*

FEMALES

1. Furca as long as wide or wider than long 4
   Furca longer than wide 2
2. Exopodite of leg 5 long, 4 times as long as wide . . **S. lenticulare** (Brady)
   Exopodite of leg 5 shorter, 3 times as long as wide 3
3. Exopodite of leg 5 with 4 apical setae, in addition to a seta at the external margin and some transverse rows of spinules . . **S. antarcticum** (Lang)

Exopodite of leg 5 with 3 apical setae, in addition to a seta at the external margin; no transverse rows of spinules . . . . **S. major** (T. Scott)

4. External seta at basis of leg 2 of strongly increased size, present as a large, setiform spine 5

External seta at basis of leg 2 normally developed, fine or absent 8

5. 2nd endopodal segment of leg 2 as long as wide 6

2nd endopodal segment of leg 2 longer than wide 7

6. Body reddish brown, cephalon usually of a light, horny color. **S. arthuri** Poppe

Body of a very light, transparent horny color, with a deep purple band on 2nd thoracic somite and on abdomen. Usually bigger than preceding form . . . . **S. arthuri var. magnum** Monk

7. Small (0.45 mm.) species, 3rd antennular segment short. Leg 5 with 6 transverse rows of spinules on exopodite. 2nd segment of exopodite leg 2 not spinulose. Color unknown . . . . **S. dentipes,** new species

Bigger (0.65–0.68 mm.) form; 3rd antennular segment long, only slightly shorter than 2nd segment. 2nd segment of exopodite leg 2 spinulose. Leg 5 with 5 transverse rows of spinules on exopodite. Body of a light horny color; thoracic somites 2 to 4 and basal parts of legs purple. **S. purpurocincta** Monk

8. 1st segment of exopodite leg 1 as long as 1st segment of endopodite. **S. ligusticum** (Brian)

1st segment of exopodite leg 1 much shorter than 1st segment of endopodite 9

9. 2nd segment of endopodite legs 3 and 4 with 1 seta . **S. hippolytes** (Krøyer)

2nd segment of endopodite legs 3 and 4 with 2 setae 10

10. Exopodite of leg 5 with only 1 terminal seta, remaining setae marginal . . 12

Exopodite of leg 5 with at least 3 terminal setae 11

11. Baso-endopodite of leg 5 with 3 setae . . . . **S. idyoides** (Brady)

Baso-endopodite of leg 5 with 2 setae 12

12. Exopodite of leg 5 inserting with broad base, internal and external wall nearly parallel, so that segment is elongate . . **S. cockburni** Fairbridge

Apical part of exopodite leg 5 narrowed, inserting with small base; internal and external margin convex, segment ovate . . . **S. australe** (T. Scott)

13. Exopodite of leg 5 with 2 short, thick setae, 1 at terminal, 1 at external border. In addition there are marginal spinules and transversal rows of spinules . . . . **S. fucicolum** (T. Scott)

Exopodite of leg 5 with 5 distinct setae 14

14. Spines at external margin of 3rd exopodal segments legs 2 to 4 lancet-shaped 16

Spines at external margin of 3rd exopodal segments legs 2 to 4 not lancet-shaped 15

15. Coxa of maxillipede with strong internal spine. Apical seta exopodite leg 5 lengthened . . . . **S. loureiroi** Jakobi

Coxa of maxillipede without spine at internal margin. Apical seta of exopodite leg 5 short . . . . **S. longicauda** (Philippi)

16. 2nd exopodal segment of leg 1 swollen. 2nd endopodal segment of leg 1 more than twice as long as wide 17

2nd exopodal segment of leg 1 not swollen, 2nd endopodal segment of leg 1 only 1½ times as long as wide. Exopodite of leg 5 broad, with 5 transverse rows of spinules . . . . **S. lamellipes** Monk

17. 2nd exopodal segment of leg 1 very strongly swollen, seta inserting at middle of swelling. Exopodite of leg 5 with transverse rows of spinules. **S. plumosum** Brady
2nd exopodal segment of leg 1 less strongly swollen, seta inserting under the swollen part. No transverse rows of spinules on exopodite of leg 5. **S. intermedium** Nicholls

MALES

1. Exopodite of leg 5 with a total of 4 appendages 4
Expodite of leg 5 with a total of 2 or 3 appendages 2
2. External marginal spines of 3rd exopodal segments legs 2 to 4 lancet-shaped. 3
External marginal spines of 3rd exopodal segments legs 2 to 4 normally developed, not lancet-shaped . . . . **S. longicauda** (Phillippi)
3. Exopodite of leg 5, 2 times as long as wide, with 3 setae, 2 of which are setose. Leg 6 composed of a lancet-shaped spine and 1 seta. **S. plumosum** Brady
Exopodite of leg 5, 1½ times as long as wide, with 3 thick setae. Leg 6 composed of 1 thick spine and 2 setae. . . . . **S. intermedium** (Nicholls)
4. One of the setae on exopodite of leg 5 lancet-shaped 5
All setae on exopodite of leg 5 normally developed 6
5. 2nd segment of endopodite leg 1 much shorter than segment 1. **S. australe** (T. Scott)
1st and 2nd segment of endopodite leg 1 of about the same length. **S. ligusticum** (Brian)
6. 2nd segment of endopodite leg 1 shorter than segment 1 . **S. arthuri** Poppe
1st and 2nd segment of endopodite leg 1 of about the same length 7
7. 2nd endopodal segment of legs 3 and 4 with 1 seta . **S. hippolytes** (Krøyer)
2nd endopodal segment of legs 3 and 4 with 2 setae . **S. lamellipes** Monk

Scutellidium dentipes, new species

FIGURES 34–36

MATERIAL.—Loc. 431, 1 ov. ♀, 0.45 mm.

DESCRIPTION.—The following has been taken from the only female specimen captured (holotype), which, after having been figured in dorsal aspect, has been dissected and mounted.

Adult female, total length 0.45 mm.; greatest diameter 0.23 mm. Body strongly built, compressed dorsoventrally, with large cephalothorax, distinctly separated from much narrower abdomen, reaching half length of cephalothorax (fig. 34). Head and 1st thoracic somite completely fused to form cephalic somite, slightly longer than combined lengths of thoracic somites 2 to 4. Greatest diameter of body at end of cephalic somite, body slightly narrowing posteriorly, frontal part broadly rounded. Rostrum invisible from above, present as triangular plate with rounded apex, pointing downward. 2nd and 3rd thoracic somites of same size, 4th slightly smaller, lateral part slightly concave. Some hairs along lateral thoracic border of thoracic somites 2 to 4.

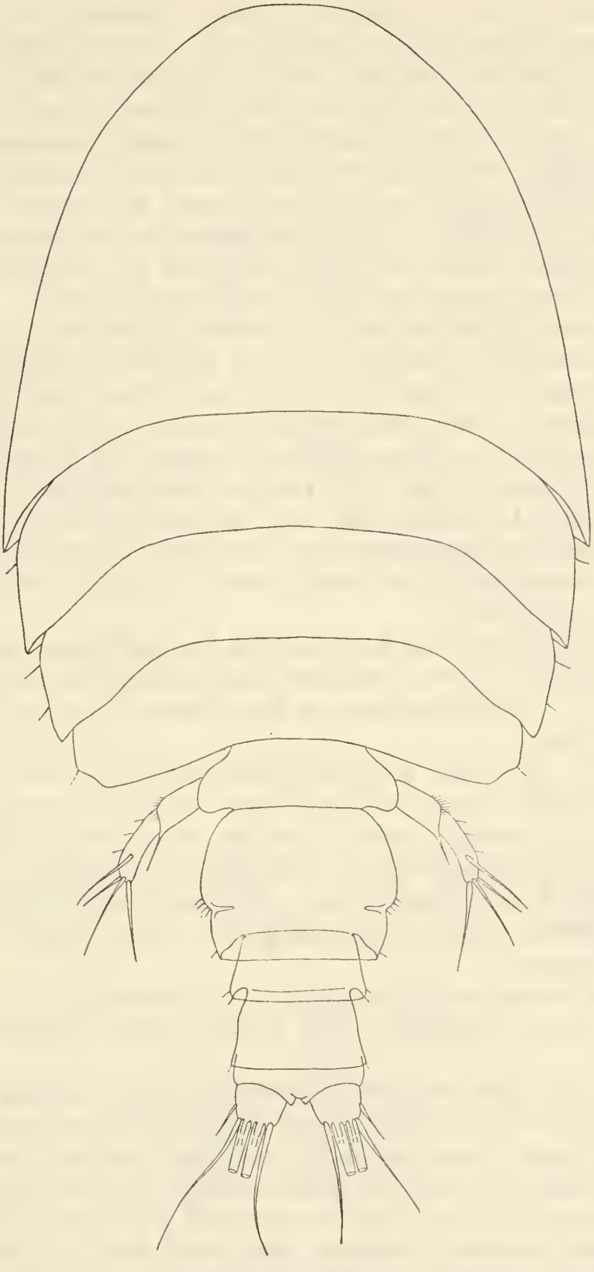

FIGURE 34.—*Scutellidium dentipes*, new species, loc. 431, ad. ♀, holotype: whole animal, dorsal view. (× 310)

5th thoracic somite suddenly greatly narrowed, with rounded lateral parts, distinctly visible from above. Genital somite composed of fused abdominal somites 1 and 2, big, line of fusion distinctly visible in dorsal and lateral aspects as a chitinized ridge in distal third of somite. Sides of genital somite distinctly swollen, greatest diameter exceeds length. Some spinules near line of fusion and some at distal end of somite. Abdominal somites 3 and 4 strongly telescoped, combined length equal to that of genital somite, 4th longer than 3rd. Some spinules at distal end of somites 3 and 4. Anal somite small, with small, semicircular anal plate, visible from above.

Furcal rami cylindrical, slightly diverging, as long as broad. 5 marginal setae (appendicular seta not observed, probably because accumulation of dirt on abdomen made observation impossible). Setae 1 and 4 of about same moderate length, seta 5 very small and halfway along external furcal border. Setae 2 and 3 lengthened and thickened, especially 2nd, which reaches about total body length; 3rd half as long. Antennules (fig. 36*a*) moderately long, 9-segmented, 2nd and 3rd segments separated. 4th segment with small conical process, bearing aesthetasc and 2 setae. Complete setation represented in figure 36*a*.

Antenna (fig. 36*b*) with basis and 1st endopodal segment separate. Exopodite 4-segmented, number of setae on segments 2, 1, 1, and 3, respectively. 7 spiniform setae on 2nd endopodal segment, 4 of which are geniculated.

Mandible (fig. 36*c*) with well-developed palp; cutting edge of praecoxa small. Coxa and basis fused to form basopodite with 2 exceptionally strong, densely plumose setae with swollen base. Endopodite small, apparently 2-segmented, segmentation indistinct, with 3 and 6 setae respectively. Exopodite well developed, with total of 6 setae, gradually increasing in size from base to apex, and densely plumose.

The preparation of the maxillule was unsuccessful, but I observed a well-developed epipodite, with 2 very strong, densely plumose setae.

Maxilla (fig. 36*d*) with single praecoxal endite, bearing 2 densely plumose setae with thickened bases. Coxal endite small and styliform, with 2 fine setae. Basal endite well developed, coalescent with strong, slightly curved spine and with additional seta. No trace of endopodite.

Maxillipede (fig. 36*e*) chelate; coxa with single spinulose internal seta. Basis externally swollen, with small seta at swollen part, internal margin straight. Endopodite 2-segmented; 4 setae occur on 1st segment, near jointing with 2nd endopodal segment, shaped as curved spine. Apex of curved 2nd endopodal segment (spine) almost reaches jointing between basis and coxa.

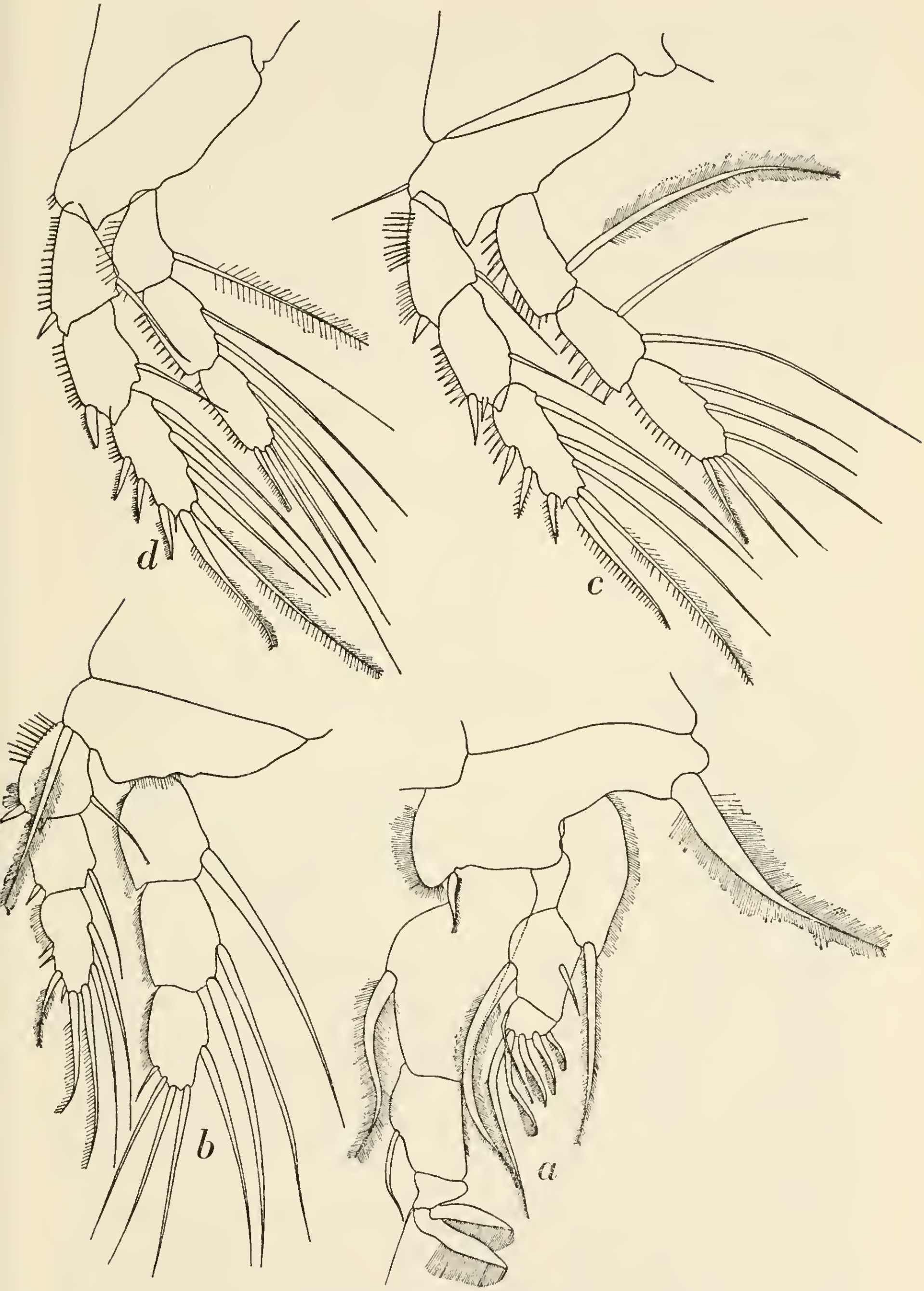

FIGURE 35.—*Scutellidium dentipes*, new species, loc. 431, ad. ♀, holotype: *a*, leg 1; *b*, leg 2; *c*, leg 3; *d*, leg 4. (× 390.)

Leg 1 (fig. 35*a*) with well-developed, broad basis, with small internal and very large external seta; both setae plumose. Exopodites and endopodites 3-segmented; 1st endopodal segment slightly longer than whole exopodite, but exopodite inserting in deep depression of basis, with the result that apex of exopodite reaches as far as ⅔ 1st endopodal segment. 1st exopodal segment with strong, plumose external seta, no internal seta. 2nd exopodal segment with strong internal seta and very small external setiform spine. 3rd exopodal segment small. 6 appendages: 1 fine seta at internal margin, 1 strong apical seta, and 4 external marginal setae with characteristic pectinate brush of hairs. Large 1st endopodal segment has strong internal seta at middle of internal margin. 2nd endopodal segment also with internal seta at middle of internal margin. 3rd endopodal segment small, carrying fine internal seta and 2 geniculate setae with pectiniform brush of hairs.

The details of legs 2 to 4 can be taken from figures 35*b*–*d*, the setal formula, and the following notes. Setal formula:

	endopodite	*exopodite*
leg 2	1. 2. 221	1. 1. 223
leg 3	1. 2. 321	1. 1. 323
leg 4	1. 2. 221	1. 1. 323

Leg 2. External seta of basis very strong. Proximal 2 spines at external margin of 3rd exopodal segment small; a small spinule occurs between 3rd spine at external margin and apical spine on that segment (fig. 35*b*).

Leg 3. External seta of basis fine and nude; internal setae of 1st and 2nd endopodal segments long and densely plumose. External margins of endopodite and exopodite strongly spinulose (fig. 35*c*).

Leg 4. External margins of endopodites and exopodites strongly spinulose (fig. 35*d*).

Leg 5 (fig. 36*f*) fairly big, reaching beyond middle of genital somite. External lobe of baso-endopodite well developed, with seta and some spinules. Baso-endopodite small, reaching ¼ length of exopodite, with total of 3 setae. Exopodite elongate, 4 times as long as greatest diameter. 5 appendages: 1 at external margin, 1 at apex, and 3 in intermediate position (see fig. 36*f*). Setae 1, 2, and 5 strong and lengthened; setae 2 and 3 small. In addition, there are 6 transverse rows of spinules across the exopodite, decreasing in size distally, for the position of which I refer to figure 36*f*.

Remarks.—The present new form shows a very great structural similarity with *Scutellidium arthuri* Poppe, but it is much smaller, about half the size of that species. In its small size it approaches *S. purpurocincta* Monk very closely (the female of *S. purpurocincta* measures 0.65–0.68 mm.) but differs in the structure of the anten-

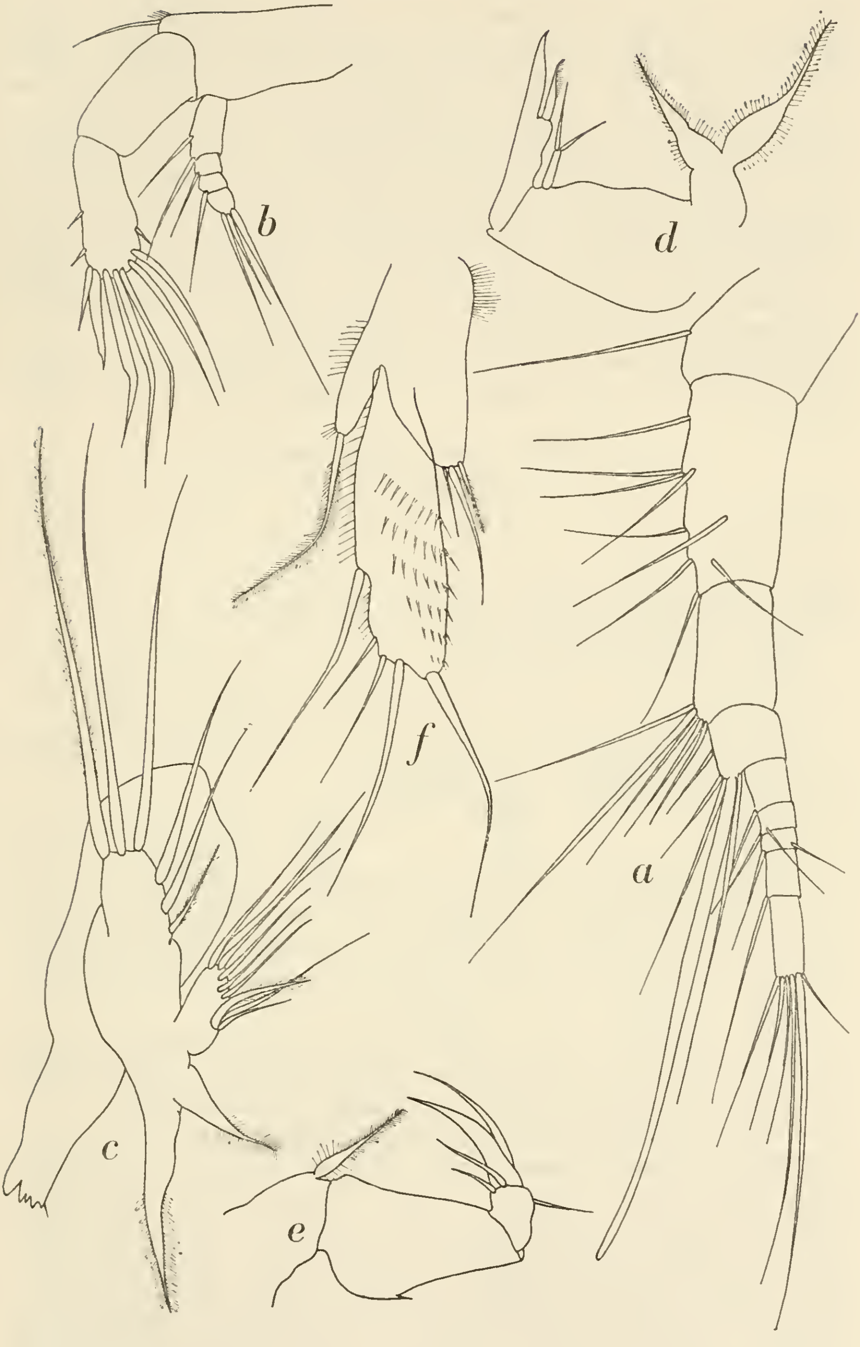

FIGURE 36.—*Scutellidium dentipes*, new species, loc. 431, ad. ♀, holotype: *a*, antennule; *b*, antenna; *c*, mandible; *d*, maxilla; *e*, maxillipede; *f*, leg 5. (× 625.)

nules. *S. purpurocincta* seems to be a characteristically colored species, a peculiarity I could not compare with my specimen, which is totally colorless from storage in alcohol. My specimen also differs from *S. arthuri* (as described by Monk, 1941, p. 97) by the greater length of the 2nd endopodal segment of leg 2. As *S. purpurocincta* is not completely described by its author (only the antennules and none of the remaining appendages are figured), I have thought it advisable to describe my specimen as completely as possible and to introduce a new trivial name, referring to the spinulosity of the legs. As stated above, the complex *S. arthuri*, *S. arthuri* var. *magnum*, *S. purporocincta*, and *S. dentipes* need closer investigation.

A single specimen of this new form was washed from caulerpas off the reef ridge north of Falarik in the Ifaluk Atoll.

Scutellidium ligusticum (Brian, 1920)

FIGURES 37–39

Idya ligustica Brian, 1920, p. 30, figs. 1–6; 1921, p. 73, pl. 9 (figs. 5–8); 1923a, p. 177.

Idyaea ligustica.—Brian, 1923, p. 129.

Tisbe ligustica.—Gurney, 1927, p. 496.—Willey, 1930, p. 84.

Machairopus ligusticus.—Brian, 1928, pp. 1, 36; 1928a, pp. 298, 311.—Vàtova, 1928, p. 181.—Lang, 1936, p. 37.

Scutellidium ligusticum.—Lang, 1948, p. 395, fig. 172 (no. 3).—Noodt, 1955a, p. 202, fig. 1.

Psamathe machairopoides Monard, 1928, p. 331, figs. 13 (no. 5), 14 (no. 1).—Lang, 1934, p. 20.—Monard, 1935a, p. 80.

Machairopus machairopoides.—Lang, 1936, p. 37.

Scutellidium machairopoides.—Sewell, 1940, pp. 164, 169, 356, 366, 368, 371, figs. 15, 16.

MATERIAL.—Loc. 431, 1 ad. ♂, 0.38 mm. Loc. 588, 1 ad. ♂, 0.36 mm. Loc. 589, 1 ♀ cop. stage V, 0.41 mm.; 5 ad. ♀♀, 0.38–0.42 mm. (0.39 mm.); 6 ad. ♂♂, 0.33–0.37 mm. (0.35 mm.). Loc. 590, 1 ad. ♀, 0.38 mm. Loc. 591, 1 ad. ♀, 0.36 mm. Loc. 638, 1 ad. ♂, 0.32 mm.

DESCRIPTION.—The following is based on the female specimen from locality 591 and the male specimen from locality 588. Both specimens, after having been figured, were dissected and mounted.

Adult female, total length 0.36 mm.; greatest diameter 0.17 mm.

Body compressed dorsoventrally, ovoid in dorsal view, not particularly broad, greatest width at end of cephalic somite, with fairly distinct division in cephalothorax and abdomen (fig. 37*a*). Head and 1st thoracic somite completely fused to form cephalic somite; in dorsal aspect narrowly rounded anteriorly, rostrum invisible from above; distal border cut off squarely. In lateral aspect back almost straight, curving broadly at anterior end to form small, bluntly pointed rostrum, completely hidden between basal parts of anten-

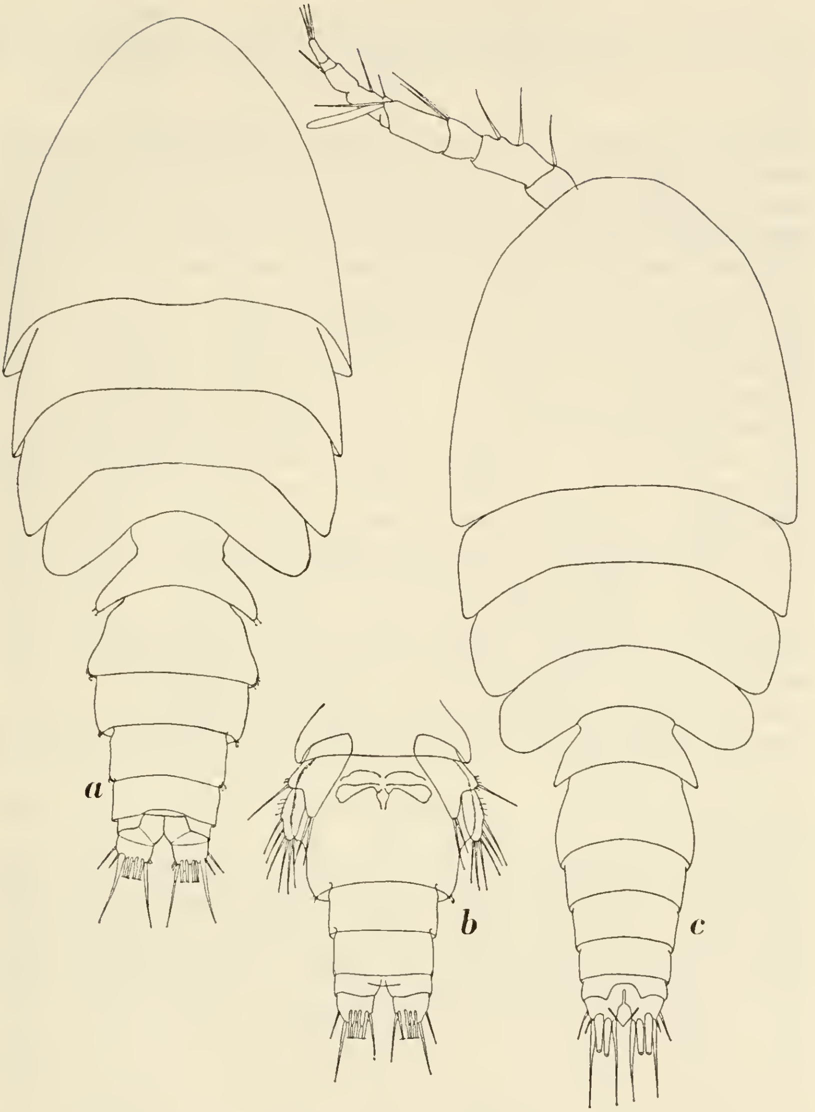

FIGURE 37.—*Scutellidium ligusticum* (Brian), loc. 591, ad. ♀: *a*, whole animal, dorsal view; *b*, abdomen and 5th legs, ventral view; loc. 588, ad. ♂: *c*, whole animal, dorsal view. (× 305.)

nules (fig. 38*a*). Rostrum points obliquely forward and downward. Length of cephalic somite 1½ times combined lengths of thoracic somites 2 to 4. Epimeral plates of somites 2 to 4 well produced laterally to cover insertion of legs; lateral part of cephalic somite also produced to cover basal parts of oral appendages. Thoracic somites 2 and 3 have about same length; somite 4 is much shorter and less wide, in dorsal aspect with laterocaudally produced, rounded epimeral plates.

5th thoracic somite small, in dorsal aspect drawn out laterally into bluntly pointed projection, set with some spinules. Abdomen ¾ length of cephalothorax; genital somite resulting from fusion between abdominal somites 1 and 2; line of fusion distinctly visible along whole of dorsal and greater part of lateral surfaces (figs. 37*a*, 38*a*). Genital somite about as long as wide and as long as rest of abdomen, furca included. There is a chitinized expansion on both sides of the genital somite near the line of fusion, which is finely haired. Abdominal somites 3 and 4 of nearly same length, with some fine spinules on laterocaudal part of distal margin. Anal somite very short, anal operculum broadly rounded, scarcely visible since it is neatly telescoped under distal end of 4th somite. Furcal rami slightly broader than long, with 5 marginal setae and 1 appendicular seta on each ramus. In addition, there are some hairs along internal and external furcal margins. Setae 1 and 4 short, with slightly swollen base. Setae 2 and 3 much thicker than other setae, damaged in this specimen, but in others greatly lengthened, especially 2nd. Seta 5 small, inserting halfway along external margin.

Ventral aspect of genital somite represented in figure 37*b*. Fusion between both composing somites complete on ventral side, no line of fusion being visible.

Antennules, antenna and mouth parts of this specimen were not studied in detail.

Leg 1 (fig. 39*a*) with both rami 3-segmented, though the terminal exopodal and endopodal segments are very small. Basis big, with strong spine at external and internal borders. 1st exopodal and endopodal segments of about same length. 1st endopodal segment with swollen internal margin, with short, thick seta halfway along that margin. 2nd endopodal segment styliform, internal seta halfway along internal margin. 3rd endopodal segment small, carrying 2 curved, apical spines, of which terminal portion is set with characteristic pectiniform row of hairs. 1st exopodal segment with small external seta nearly at end of external margin. 2nd exopodal segment about as long as broad, with seta or setiform process at end of internal margin. 3rd exopodal segment small, with 5 curiously shaped setae, apices of which have pectiniform row of hairs; in addition there is a short internal seta.

The particulars of legs 2 to 4 appear in figures 39*b–d* and the setal formula. Unfortunately, legs 3 and 4 fragmentated during dissection, but they were reconstructed. Setal formula:

	endopodite	*exopodite*
leg 2	1.2.221	1.1.223
leg 3	1.2.321	1.1.323
leg 4	1.2.221	1.1.323

Top of exopodite of leg 5 reaches middle of genital somite; apex of baso-endopodite reaches middle of exopodite. 2 setae at baso-endopodite and 1 fine seta on haired external lobe. Total number of setae on exopodite 6, external margin haired. 3 of these setae at apex and 3 along external margin. Shape of exopodite elongated ovate, 2½ times as long as wide (fig. 37*b*.)

The specimen (as all other specimens) is practically colorless, very faintly yellowish, no eye or eyespot visible. One of the females from locality 589 is ovigerous, carrying a sac with 10 eggs.

Adult male, total length 0.36 mm.; greatest diameter 0.14 mm.; length of longest furcal seta 0.15 mm.

General shape of body, especially cephalothorax, strongly suggestive of that of female, compressed dorsoventrally, ovoid in outline, with distinct division between cephalothorax and abdomen, with proportional length of 18:8 (fig. 37*c*). Rostrum invisible from above; in lateral aspect, forms conical eminence, almost hidden between basal parts of antennules, and points downward. Line of back, in lateral view, very straight, at anterior end of cephalon curving strongly into rostrum (fig. 38*b*). Length of cephalic somite slightly superior to combined lengths of thoracic somites 2 to 4. Epimeral plates of 2nd thoracic somite produced into bluntly pointed parts; on thoracic somites 3 and 4 these plates are rounded.

5th thoracic somite small, pointed in dorsal aspect. Genital (1st abdominal) somite fairly long, 1½ times length of 2nd abdominal somite; all abdominal somites have smooth margins. Anal somite very short, anal flap invisible. Rami of furca about as long as wide, with 5 marginal setae and 1 appendicular seta. Setae 1 and 4 of nearly same length, short. Setae 2 and 3 lengthened and thickened, especially 2nd; seta 5 placed halfway along external furcal margin, small.

Antennules (fig. 39*j*) composed of 9 segments, 4th and 5th segments completely fused to form large, slightly swollen segment with conical process, carrying aesthetasc and 2 setae. Between segments 7 and 8 the articulation is indistinct; two of the apical setae of segment 9 may have sensory function and have thickened bases.

Antenna (fig. 39*e*) with basis and 1st endopodal segment separate. Exopodite 4-segmented, number of setae 2, 1, 1, and 3, respectively. Endopodal segment 1 with seta halfway along internal margin; 2nd segment with 2 internal and 6 apical setae, 4 of which are geniculate.

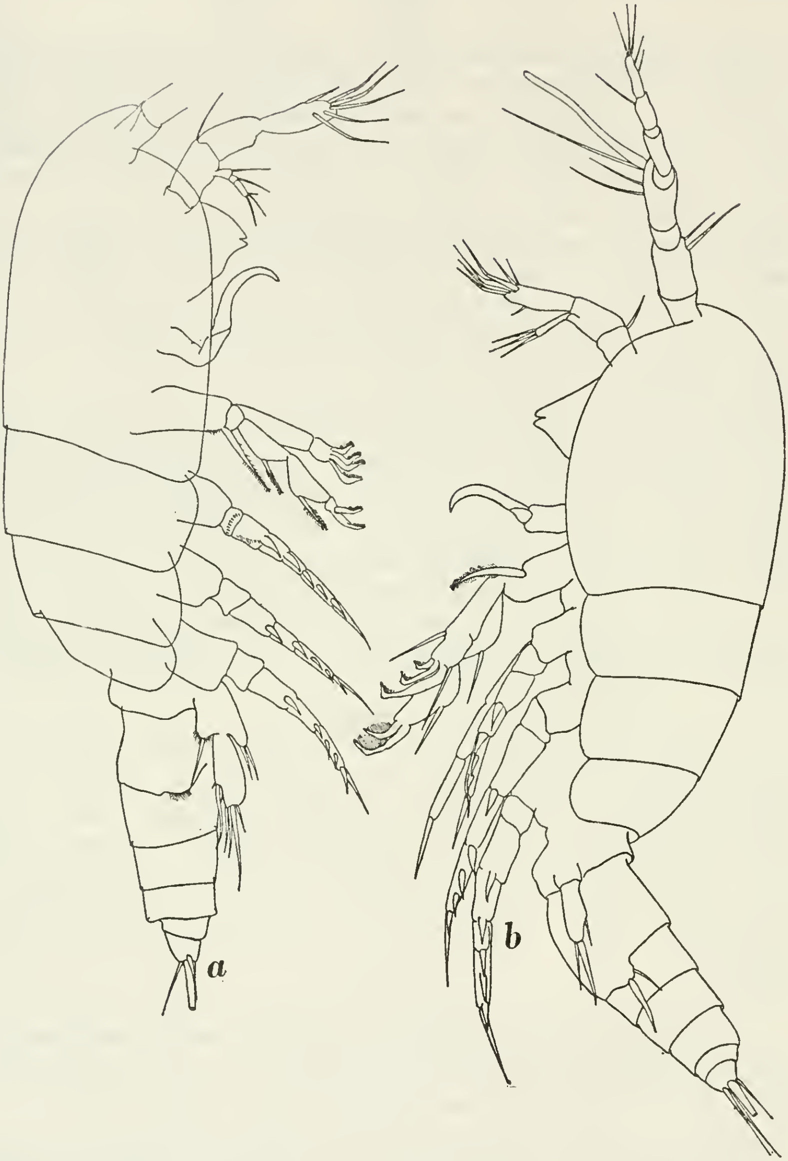

FIGURE 38.—*Scutellidium ligusticum* (Brian), loc. 591, ad. ♀: *a*, lateral view of whole animal from right side; loc. 588, ad. ♂: *b*, lateral view of whole animal from left side. (× 305.)

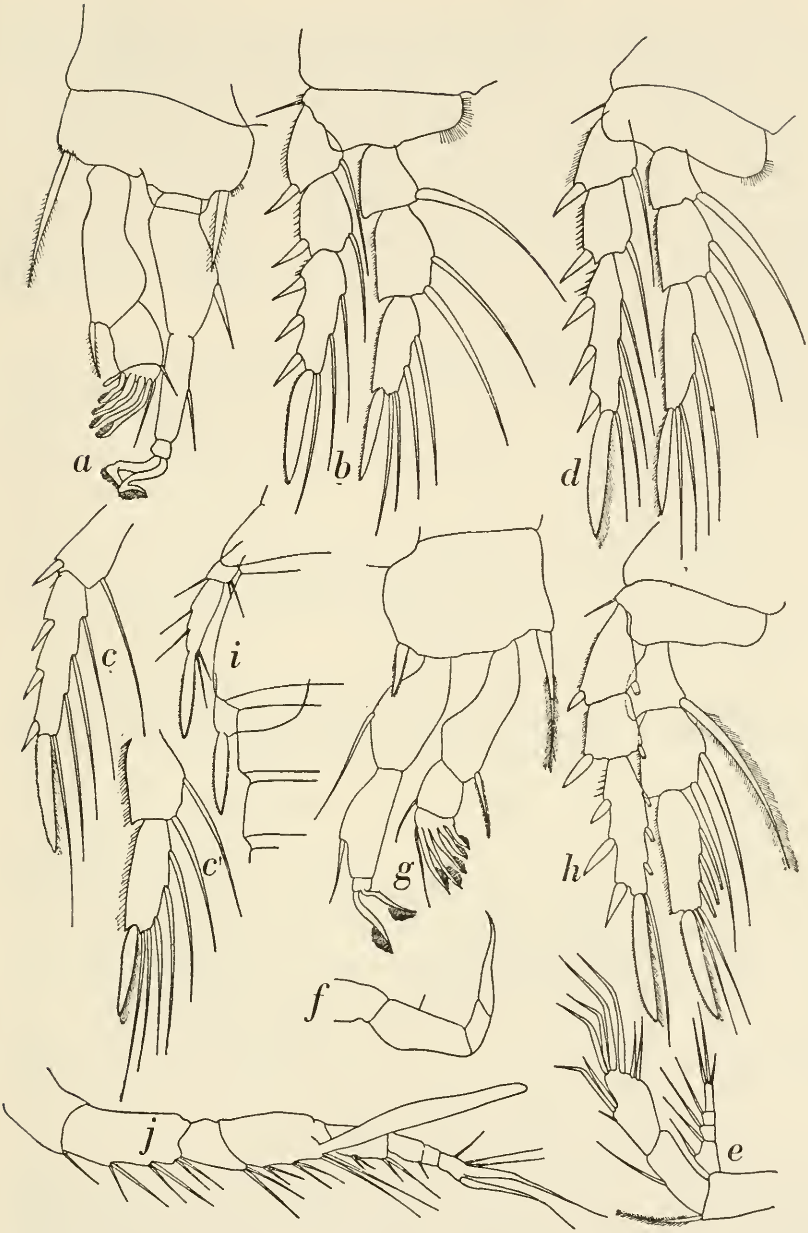

FIGURE 39.—*Scutellidium ligusticum* (Brian), loc. 591, ad. ♀: *a*, leg 1; *b*, leg 2; *c*, exopodite of leg 3, segments 2 and 3; *c'*, endopodite of leg 3, segments 2 and 3; *d*, leg 4; loc. 588, ad. ♂: *e*, antenna; *f*, maxillipede; *g*, leg 1; *h*, leg 3; *i*, right part of genital somite with legs 5 and 6, ventral view; *j*, antennule. (× 420.)

I failed to obtain a satisfactory preparation of the oral appendages, but the maxillipede (fig. 39*f*) is in good position. Coxa short, basis with straight internal margin with fine seta and slightly concave external margin. Endopodite articulating with basis to form claw, 2-segmented; segmentation fairly distinct; no additional setae.

Legs 1 to 4 as in female, pectinate setae on exopodites and endopodites of leg 1 slightly different from those of female, as appears from comparison of figures 39*a* (♀) and 39*g* (♂). No difference in setal formula. As in female, exopodites and endopodites of legs 2 to 4 have terminal segments armed with apical spines with broad lamellar edge, very finely serrated.

Leg 5 small, exopodite elongate, reaching (without apical spine) halfway along genital somite. Strong apical spine with broad, finely serrated lamellar edge, fully as long as exopodite. 2 external and 2 internal setae. Baso-endopodite small, with much reduced external lobe carrying 1 fine seta, and 2 short setae on baso-endopodite itself (fig. 39*i*).

The genital somite ventrally carries two large genital plates, produced caudally and overlapping the distal border of the genital somite. Apex armed with strong spine with broad, serrated lamella, as is also present on leg 5 (fig. 39*i*).

I failed to observe not only the external seta at the base of the lancet-shaped spine of leg 5 but also the corresponding seta at the genital plate, which, according to Brian's description, should have been present.

As in the female, the specimen (as all other males) is colorless; no eye or eyespot could be observed.

Remarks.—The specimens agree perfectly with the descriptions by Brian (1920, 1928), Monard (1928) and Lang (1948), the only point of difference being the absence of the external seta at the base of the big spine of legs 5 and 6 (genital plate). *Scutellidium ligusticum* has been recorded in the following localities: Roscoff, France, on the English Channel (Monard, 1935); Banyuls-sur-Mer, France, on the Mediterranean (Monard, 1928); the Gulf of Genoa, Italy (Brian, 1920, 1921, 1928); Sardinia (Brian, 1923, 1928); Rovinj, Yugoslavia, on the Adriatic (Brian, 1923, 1928, Vátova, 1928); the Aegean islands of Astypalaia, Jalì, Syme, and Karpathos (Brian, 1928); Bermuda in the Atlantic (Willey, 1930); and Teneriffe in the Canary Islands (Noodt, 1955*a*). Brian's female specimens measured 0.5–0.7 mm., whereas the males were slightly smaller. Noodt mentions two male specimens of 0.37 mm. length. Sewell reports upon female and male specimens from Nancowry Harbour in the Nikobar Islands (♀, 0.70 mm., ♂, 0.6 mm.), but his specimens are very big and, though no structural differences with the present specimens can be lifted from his description, the record of these exceptionally large specimens from the Indo-Pacific area must be taken with some reserve.

In the Ifaluk collection the species proved to be unexpectedly well represented in washings of algae and in sand samples; it seems to be a characteristic element of the smaller reef fauna.

Family Porcellidiidae G. O. Sars, 1904

This family includes a single genus: *Porcellidium* Claus, 1860 (= *Thyone* Philippi, 1840).

Genus *Porcellidium* Claus, 1860

The type of genus is *Thyone viridis* Philippi, 1840; it has the following species:

FEMALES	MALES
Thyone viridis Philippi, 1840	*T. viridis* Philippi, 1840
(= *Porcellidium fimbriatum* Claus, 1863; *P. fasciatum* Boeck, 1864; *P. subrotundum* Norman 1868; *P. lecanoides* Claus, 1889; *P. fimbriatum* var. *heraldicum* Monard, 1928; *P. f.* var. *macrurum* Monard, 1928; *P. lecanoides* var. *roscoffensis* Bocquet, 1948; *P. sarsi* Bocquet, 1948)	
P. tenuicauda Claus, 1860	*P. tenuicauda* Claus, 1860
(= *P. dentatum* Claus, 1860)	
P. ovatum Haller, 1879	*P. ovatum* Haller, 1879
(= *P. parvulum* Haller, 1879; *P. scutatum* Claus, 1889; *P. acuticaudatum* Thompson and A. Scott, 1903)	
P. fulvum Thomson, 1882	*P. fulvum* Thomson, 1882
P. interruptum Thomson, 1882	
P. brevicaudatum Thompson and A. Scott, 1903	
P. ravanae Thompson and A. Scott, 1903	
(= *P. tuberculatum* Wolfenden, 1905)	
P. affine Quidor, 1906	*P. affine* Quidor, 1906
(= *P. charcoti* Quidor, 1906; *P. rotundum* Brady, 1910; *P. australe* Brady, 1910; *P. wolfendeni*, Brady, 1910)	
P. scotti Pesta, 1935	
P. clavigerum Pesta, 1935	

The position of the following species is uncertain:

	Porcellidium spec. Pesta, 1935

The species *Porcellidium fimbriatum* (= *Porcellidium viride* (Philippi)) has been defined by Bocquet (1948) as "Supraespèce," by which vague term Bocquet probably wants to indicate that the species can be separated into morphologically and biometrically more or less distinct local forms, separable especially by the structure of the furca. Though the structure of the furca in this particular genus undoubtedly is of major taxonomic importance, we must account, nevertheless, for a certain degree of variability of this important structure in the various forms attributable to the genus *Porcellidium.* I am inclined, therefore, to consider Bocquet's subdivisions of this "supraespèce" with some reserve and I have arranged, at least provisionally, the various "species" defined by Bocquet under the heading *Porcellidium viride.*

In addition to the species listed above, a new species will be described below as *Porcellidium malleatum.* The new form can be fitted in the following way into the key given by Lang (1948, p. 419) for the females of this genus. The inclusion of *Porcellidium fulvum* in this key is on Nicholl's authority (1941).

Key to the Females of *Porcellidium*

1.	Furca pointed, i.e., furca narrowing into a point or cut off obliquely	2
	Furca not pointed, cut off squarely or rounded	5
2.	Margin of body, especially cephalic somite, set with hairs.	**P. brevicaudatum** Thompson and A. Scott
	Margin of body without hairs	3
3.	Furca cut off obliquely	**P. ovatum** Haller
	Furca gradually narrowing	4
4.	Furca rounded at the apex	**P. ravanae** Thompson and A. Scott
	Furca cordate	**P. tenuicauda** Claus
5.	Greatest diameter of furca at about halfway its length	6
	Greatest diameter of furca at the apex of furca with parallel walls	8
6.	Furca quadrate, about as long as wide	**P. fulvum** Thomson
	Furca elongate, twice (or more) as long as wide	7
7.	Body twice as long as broad; big (about 1 mm. length) species.	**P. affine** Quidor
	Body 1⅓ as long as wide, small (0.60 mm.) species.	**P. malleatum,** new species
8.	5th legs covering the whole length of the furca and, curving round the furca, almost touching in the median line	**P. interruptum** Thomson
	5th legs covering the length of abdomen with furca, not meeting in the median line	8
9.	Furca broadening distally, at apex twice as wide as at insertion.	**P. scotti** Pesta
	Furca with almost parallel walls	9
10.	Internal seta of endopodite leg 1 inserting proximally	**P. viride** Philippi
	Internal seta of endopodite leg 1 inserting distally	**P. clavigerum** Pesta

Porcellidium malleatum, new species

FIGURES 40–44

MATERIAL.—Loc. 431, 1 ad. ♀, 0.57 mm.; 2 ad. ♂♂, 0.47 and 0.48 mm.

DESCRIPTION.—The following is based on the female holotype and the male allotype (0.48 mm. length), both of which have been dissected and mounted. The second male has been labelled as paratype.

Adult female, total length 0.57 mm., greatest diameter 0.39 mm.

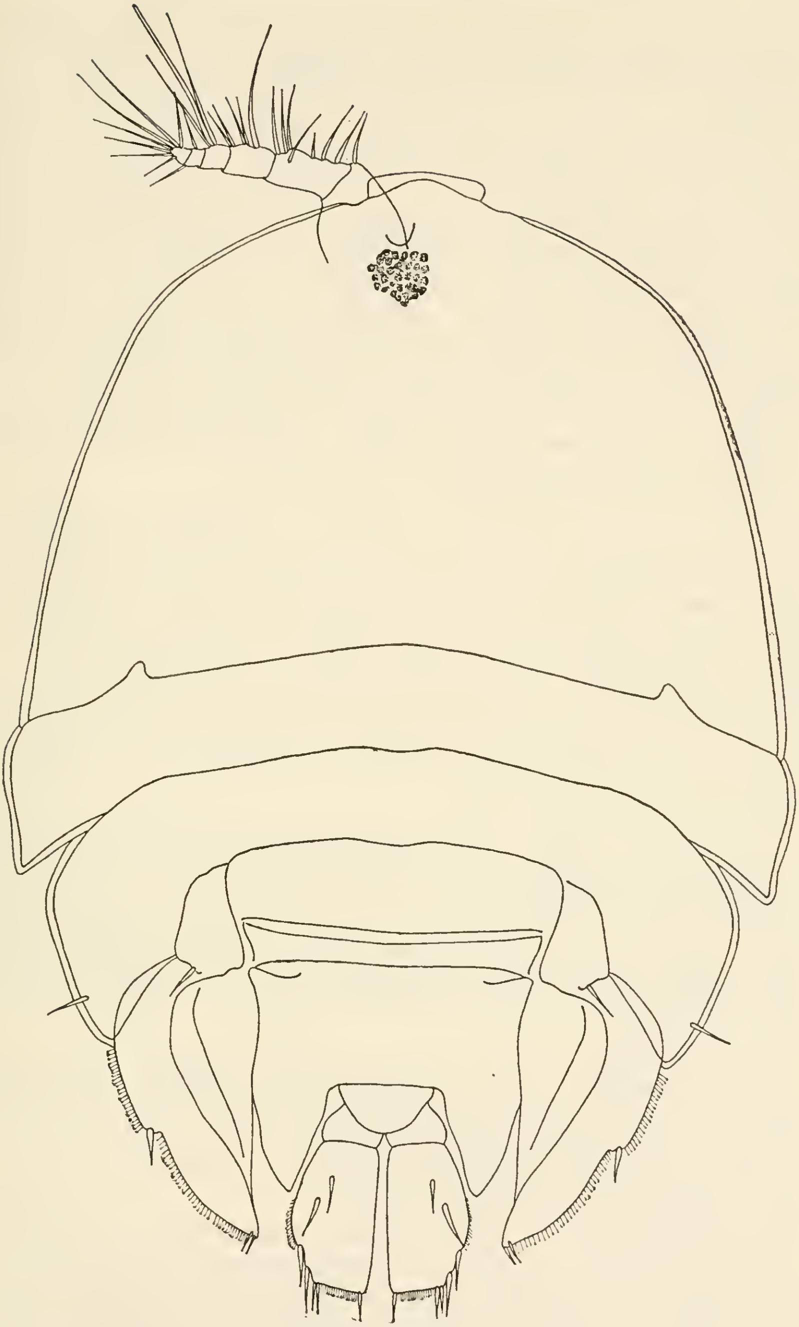

FIGURE 40.—*Porcellidium malleatum*, new species, loc. 431, ad. ♀, holotype: whole animal, dorsal view (slightly flattened by pressure of cover glass). (× 250.)

Body of the general shape characteristic for this genus, strongly compressed dorsoventrally, in outline broadly ovoid, shaped like a shield (fig. 40). Body, in lateral aspect, almost straight, but ventral surface is concave; oral parts and legs (with the exception of leg 5) situated in ventral cavity. Head and 1st thoracic somite fused to form cephalic somite. Anterior part of cephalic somite rounded, almost semicircular, slightly produced between basal parts of antennules and supporting a distinctly visible rostral base; distally cut off squarely (fig. 43*a*). Rostrum invisible from above, pointing downward, triangular, apex blunt. 2nd and 3rd thoracic somites of about same length, epimeral plates well developed (exact shape can best be judged from figure 40); 3rd with hairlike spine on each side. Cephalic somite and epimeral plates of thoracic somites 2 and 3 with a narrow hyaline lamella. 4th thoracic somite visible from above, but epimeral plates are undeveloped.

5th thoracic somite visible in dorsal aspect as narrow strip, to which wing-shaped 5th legs are attached. Abdomen composed of two parts, big genital complex and small anal part, each apparently resulting from fusion of some somites (fig. 43*b*). Anal complex with slightly concave lateral walls, backwardly produced into pointed wings, reaching half length of furcal rami. Anal complex small, in preserved specimens curved under body, but carefully stretched in figured female; anal complex fits, with part of furcal rami, in depression formed by lateral wings of genital complex, and has triangular anal flap with rounded apex.

Furcal rami lamellar, twice as long as broad, internal margin straight, external margin convex, with the result that greatest diameter is at about half its length; extreme apex cut off squarely. 5 short marginal setae and 2 appendicular setae inserting on surface of each ramus. Position of marginal setae can best be judged from figure 43*b*; the appendicular setae insert close together on the lateral part of the upper half of each ramus. Between the marginal setae the margin is haired.

5th legs, in a dorsal view of the whole body, appear as wing-shaped structures, of which the apex reaches halfway along the furcal rami. There is a distinct longitudinal carina on the legs, the external margin fringed with spiniform hairs; there are two short setae, the position of which will be indicated below.

The whole carapace has a characteristic reticulated appearance ("malleatus"=hammered) as though the integument is covered by small, hollowed depressions, giving the carapace a malleated appearance. This very distinctive pattern is best developed on the cephalic somite and gradually disappears caudally on the thoracic somites. At the antennular bases there is, on each side, a cup-shaped cuticular

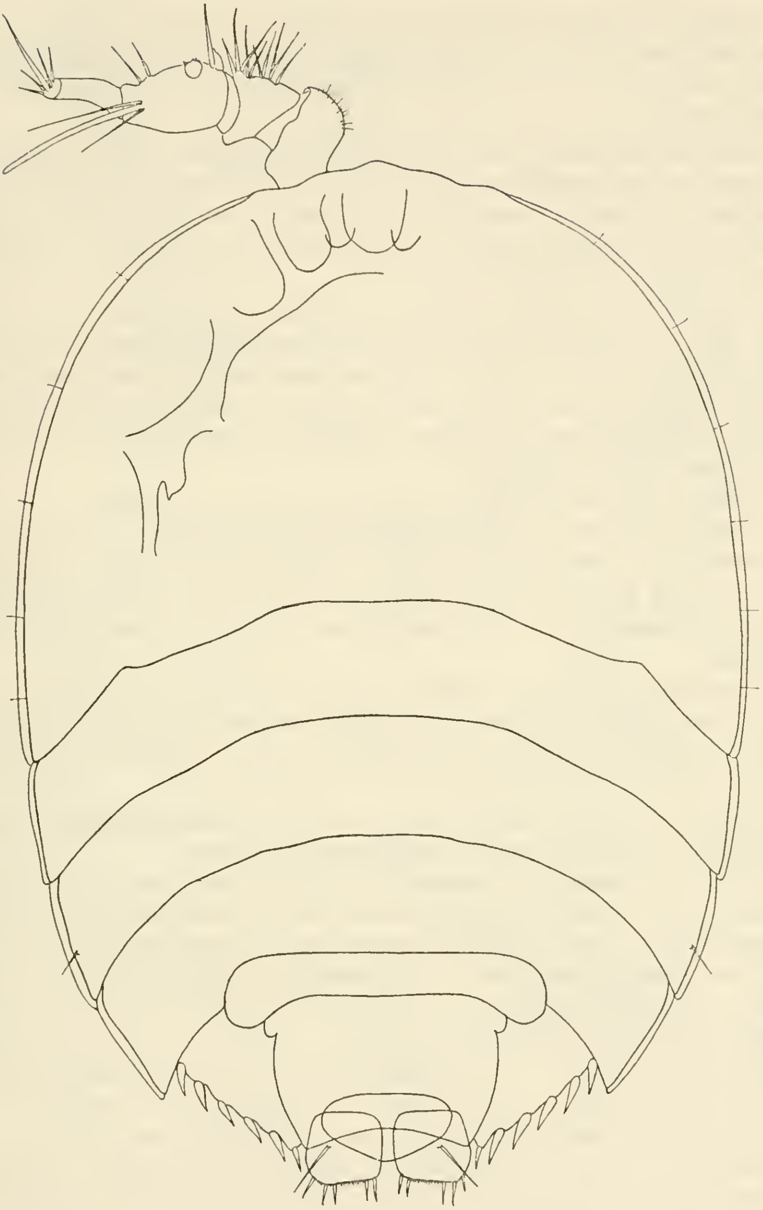

FIGURE 41.—*Porcellidium malleatum*, new species, loc. 431, ad. ♂, allotype: whole animal, dorsal view. (× 275.)

thickening, probably representing a cup-shaped light-perceiving organ. There is no trace of a median eye; some dispersed hairs occur along the cephalic border. The carapace is opaque and has a yellowish-green color.

Antennules (fig. 42*a*) short, 6-segmented. 2nd segment fairly long; 4th segment with a very short conical process bearing an aesthetasc and some setae. The setation of this appendage is represented in figure 42*a*.

Antenna (fig. 42*b*) with basis and 1st endopodal segment separate. Exopodite apparently 1-segmented; with total of 6 strong setae and indication of small spine at apex. 6 setae on 2nd endopodal segment, 1 of which is dagger-shaped, 3 are geniculate and of a particular structure, and 2 are setose.

Praecoxa of mandible elongated, cutting edge small, with 6 teeth (fig. 42*c*). Palp strongly compressed, greatly developed. Coxa and basis fused together, with 9 marginal setae and 1 appendicular seta. Endopodites and exopodites well developed, unsegmented, the former with 4, the latter with 5 setae. All setae densely setose, some with thickened bases (fig. 42*d*).

I failed to obtain a suitable preparation of the maxillule.

Maxilla (fig. 42*f*) small, with a distinct praecoxal endite, bearing 5 setae, and a small coxal endite, carrying single seta. Basis and basal endite fused, well developed, with 6 marginal setae, increasing in size proximally. More proximal seta, however, short and dagger-shaped.

Maxillipede (fig. 42*g*) small, coxa with single fine seta. Basis with strong, haired, internal, spiniform process and apical, geniculate seta. Endopodite small, unsegmented, with 2 geniculate setae of same shape as that on basis.

Legs 1 to 4 with very strongly chitinized intercoxal plates, acting as strong trabeculae connecting left and right coxa.

Leg 1 (fig. 44*a*) with strongly developed, flat basis; endopodite 2-segmented, exopodite 3-segmented. Basis triangular, with strong external seta. 1st exopodal segment with setose external seta, 2nd segment with 1 setose seta, 3rd exopodal segment with 3 of such setae. In addition, there are, on the 3rd exopodal segment, 2 apical setae and a very strong internal seta. All setae at external margin with swollen bases. 1st endopodal segment large, triangular and flattened, with single internal seta. 2nd endopodal segment small, with 2 apical spines with longitudinal, pectiniform row of hairs.

Legs 2 to 4 all of same pattern. Basis transversally elongated, endopodites and exopodites 3-segmented. The details of these feet can be taken from figures 43*c*, 44*b*,*c*, the setal formula, and the following notes. Setal formula:

	endopodite	*exopodite*
leg 2	1.2.221	1.1.223
leg 3	1.2.113	1.1.323
leg 4	1.1.112	1.1.323

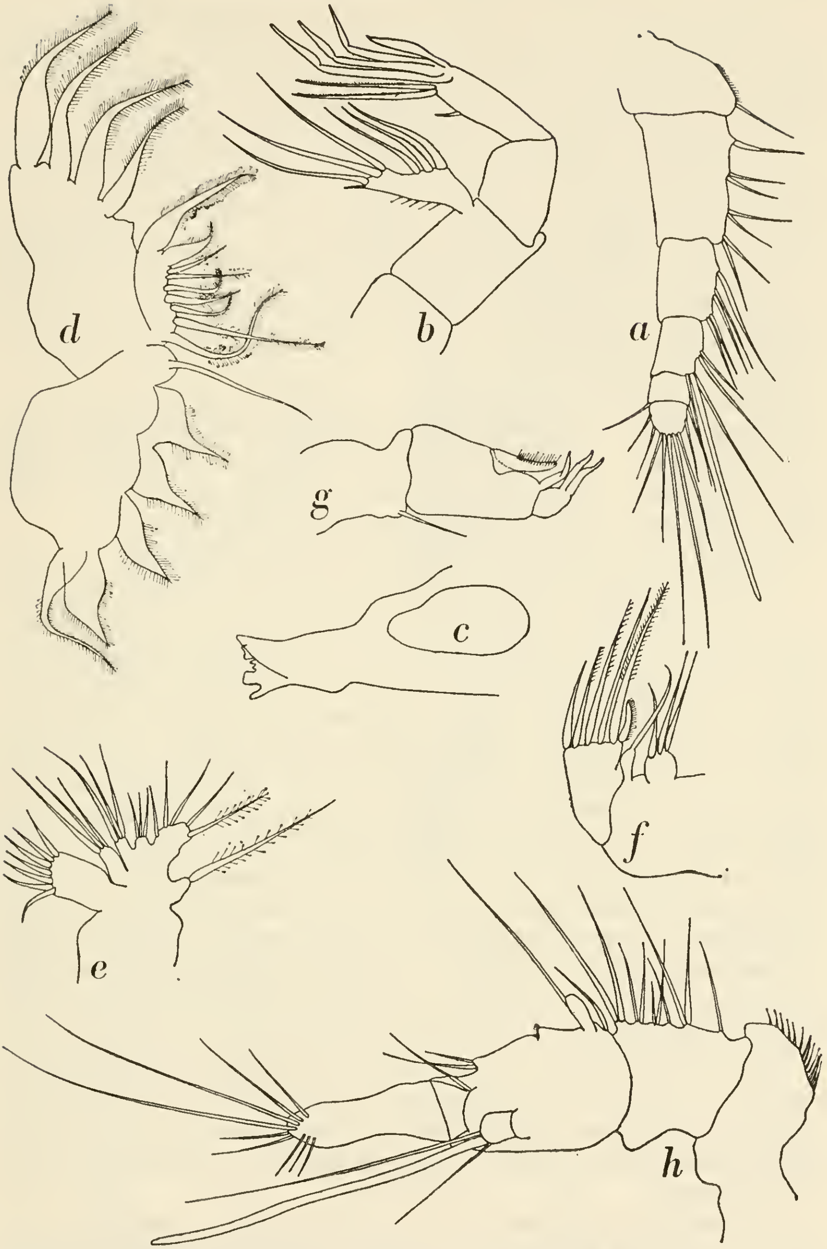

FIGURE 42.—*Porcellidium malleatum*, new species, loc. 431, ad. ♀, holotype: *a*, antennule; *b*, antenna; *c*, mandibular praecoxa; *d*, mandibular palp; *f*, maxilla; *g*, maxillipede; ad. ♂, allotype: *e*, maxillule; *h*, antennule. (× 460.)

Leg 2 (fig. 44*b*) with strongly developed endopodite; apex of exopodite reaches halfway along 2nd endopodal segment. Transversal row of spinules on 1st endopodite and exopodal segments. Spines along external margin of 3rd exopodal segment notably small.

Leg 3 (fig. 44*c*) with normally developed endopodite. 2nd endopodal segment with particularly strong, serrate internal seta; 3rd endopodal segment with very strong, serrated apical spine and 3 internal setae. Longitudinal row of spinules on 1st exopodal segment.

Leg 4 (fig. 43*c*) with short endopodite, reaching jointing between 2nd and 3rd exopodal segments. Internal setae on 2nd and 3rd exopodal segments strong and nude. Transversal row of spinules occurs on 1st endopodal and exopodal segments.

Baso-endopodite of leg 5 vestigial, scarcely visible; external process with long seta. Exopodite cordate, with longitudinal carina, terminating apically in spinule. External margin set with acute spinules, interrupted about halfway along that margin by short seta. Additional small seta at extreme apex of exopodite (fig. 43*d*).

Adult male, total length 0.48 mm.; greatest diameter 0.33 mm.

The adult male differs from the adult female in the following points:

1. Body little less slender, very broadly ovate, nearly circular. Rostrum scarcely developed and much smaller than in female, no more than fraction of base visible in dorsal aspect (fig. 41). 4th thoracic somite, as 2nd and 3rd, with well-developed epimeral plates, 5th thoracic somite small. Genital complex with slightly convex lateral walls, hollowed caudally, only slightly backwardly produced and covering fraction of furcal rami, 2 fine hairs on each side (fig. 44*d*). Anal somite fitted into hollowed part of genital complex, scarcely visible from above, anal plate very distinct, slightly larger than in female. Furcal rami shorter, curved under body, about 1½ times as long as wide, greatest diameter at half their length, internal margin straight, external margin strongly swollen. 5 marginal setae and an appendicular seta on each ramus. 5th legs very broad, fitting into space between epimeral plates of 4th thoracic somite and genital complex (fig. 43*f*).

2. Malleated pattern in male even more strongly developed than in female. Cephalic somite, as in female, has internal system of strongly chitinized trabeculae, here distinctly visible through carapace. Some scattered hairs along edge of body and seta on epimeral plate of 3rd thoracic somite.

3. Antennules 4-segmented: 1st segment without setae but with row of very acute spinules; 3rd segment slightly swollen proximally, with short spiniform process and distally with slightly protruding conical process, carrying aesthetasc and 2 setae. Setation of antennule represented in figure 42*h*.

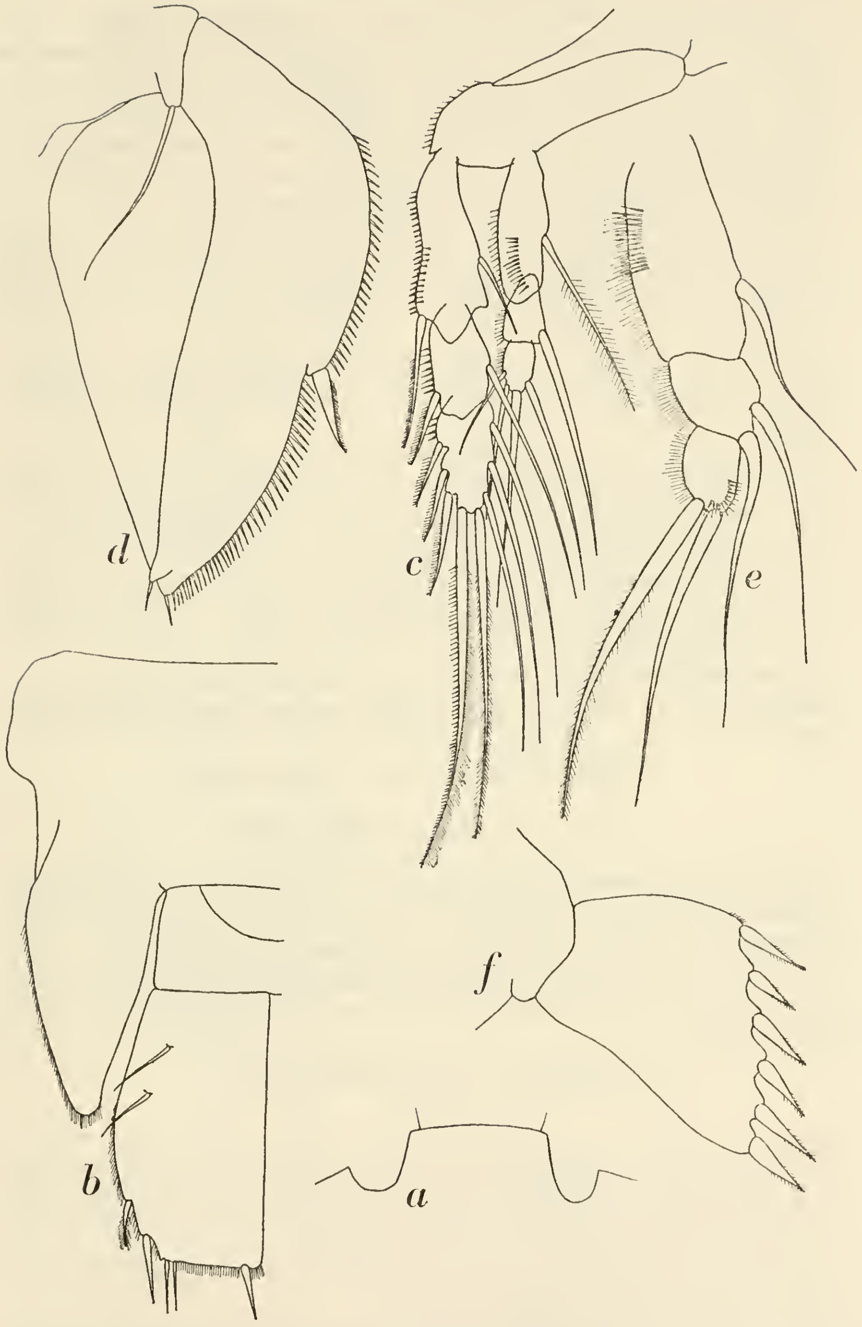

FIGURE 43.—*Porcellidium malleatum*, new species, loc. 431, ad. ♀, holotype: *a*, rostrum, dorsal view; *b*, abdomen, left part, dorsal view; *c*, leg 4; *d*, leg 5; ad. ♂, allotype: *e*, endopodite of leg 2; *f*, leg 5. (*a*, × 275; *b-f*, × 460.)

Antenna and mouth parts identical with those of female. I obtained a good preparation of the maxillule, which has been figured here (fig. 42*e*). The praecoxal arthrite is well developed, carrying 7 spiniform setae. Coxa and basis each with small endite, each with 3 setae. Basopodite with 3 additional setae and a small unsegmented endopodite, carrying 5 setae. There is no trace of an exopodite, but there is a small basal exite with a single, strong seta.

4. Legs 1 to 4 as in female, with exception of endopodite of leg 2, which is slightly transformed, as appears from reduction of number of setae on 3rd endopodal segment: in female, 4; in male, only 2 (fig. 43*e*).

5. 5th legs with short, flipper-shaped exopodite with 6 marginal, short setae. No trace of external lobe of baso-endopodite (fig. 43*f*).

REMARKS.—This new species approaches *Porcellidium affine* Quidor in many respects; it is, however, much smaller and with a more broadly ovate body. The furca, in the female of the present species, is cut off squarely at the end, and in *P. affine* it is rounded; in the male of the present species there are 6 normally haired setae along the margin of leg 5; in *P. affine* these setae, with the exception of the more superior, are denticulated.

Three individuals of the present new species were washed from caulerpas off the reef ridge at the north end of Falarik in the Ifaluk Atoll.

Family Peltidiidae G. O. Sars, 1904

Genus *Peltidium* Philippi, 1839

In addition to some juvenile specimens of the type of this genus, *Peltidium purpureum* Philippi, 1839, there are individuals of *P. intermedium* A. Scott, 1909, and *P. exiguum* A. Scott, 1909. Keys to the females and males of this genus have been published by Lang (1948, p. 430) and Nicholls (1941, p. 391); the genus will not be discussed here.

Peltidium purpureum Philippi, 1839

FIGURE 45

Peltidium purpureum Philippi, 1839, p. 131, pl. 4 (figs. 12, 13).—Vàtova, 1928, p. 181.—Marine Biological Association, 1931, p. 161.—Nicholls, 1941, pp. 390, 392, 393.—Dahl, 1948, p. 92.—Lang, 1948, p. 431, fig. 184 (no. 1).—Marine Biological Association, 1957, p. 164.

MATERIAL.—Loc. 638, 1 juv. specimen, 0.48 mm. Harry Sta. 41, 2 juv. specimens, 0.54 and 0.55 mm.

DESCRIPTION.—The following notes are based on the specimen from locality 638. Total length 0.48 mm.; greatest diameter 0.30 mm.; longest furcal seta 0.23 mm.

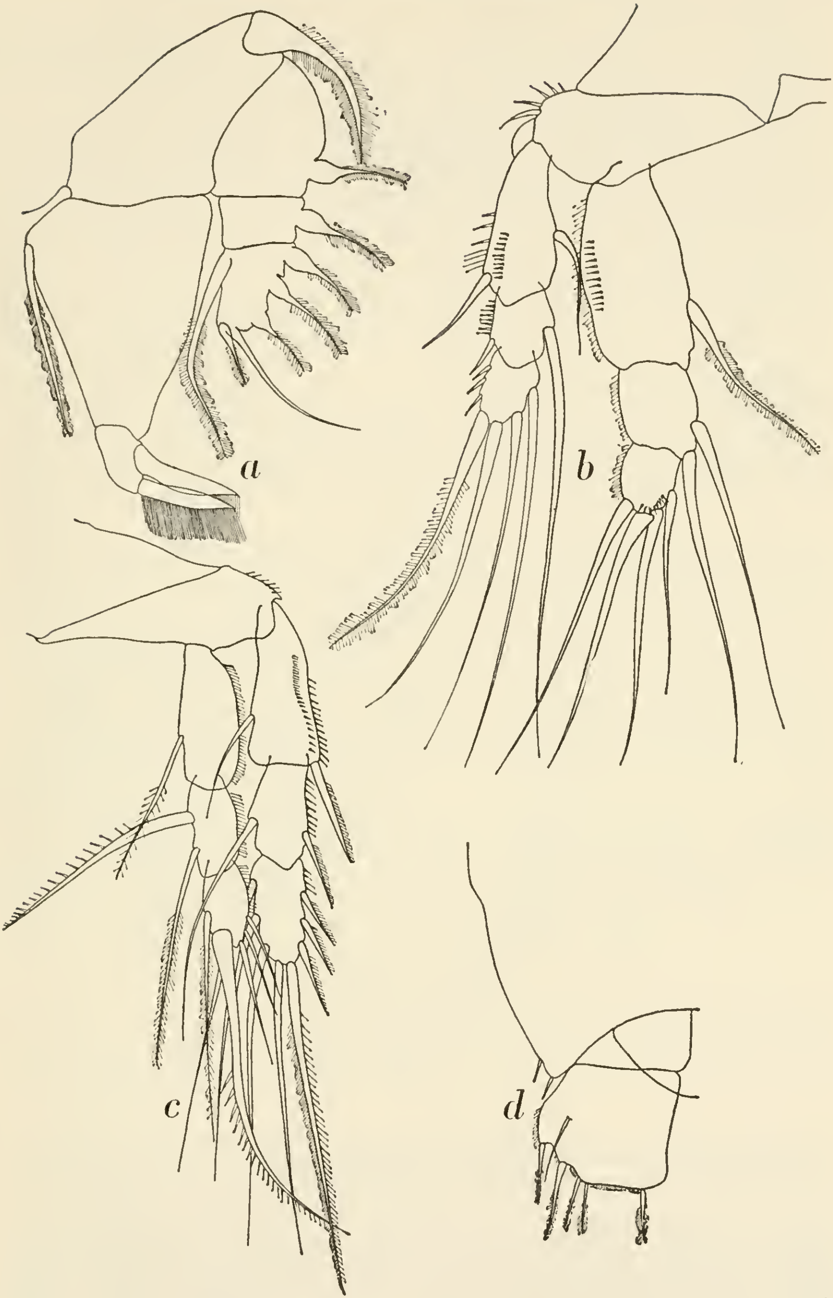

FIGURE 44.—*Porcellidium malleatum*, new species, loc. 431, ad. ♀, holotype: *a*, leg 1; *b*, leg 2; *c*, leg 3; ad. ♂, allotype: *d*, abdomen, left part, dorsal view. (× 460.)

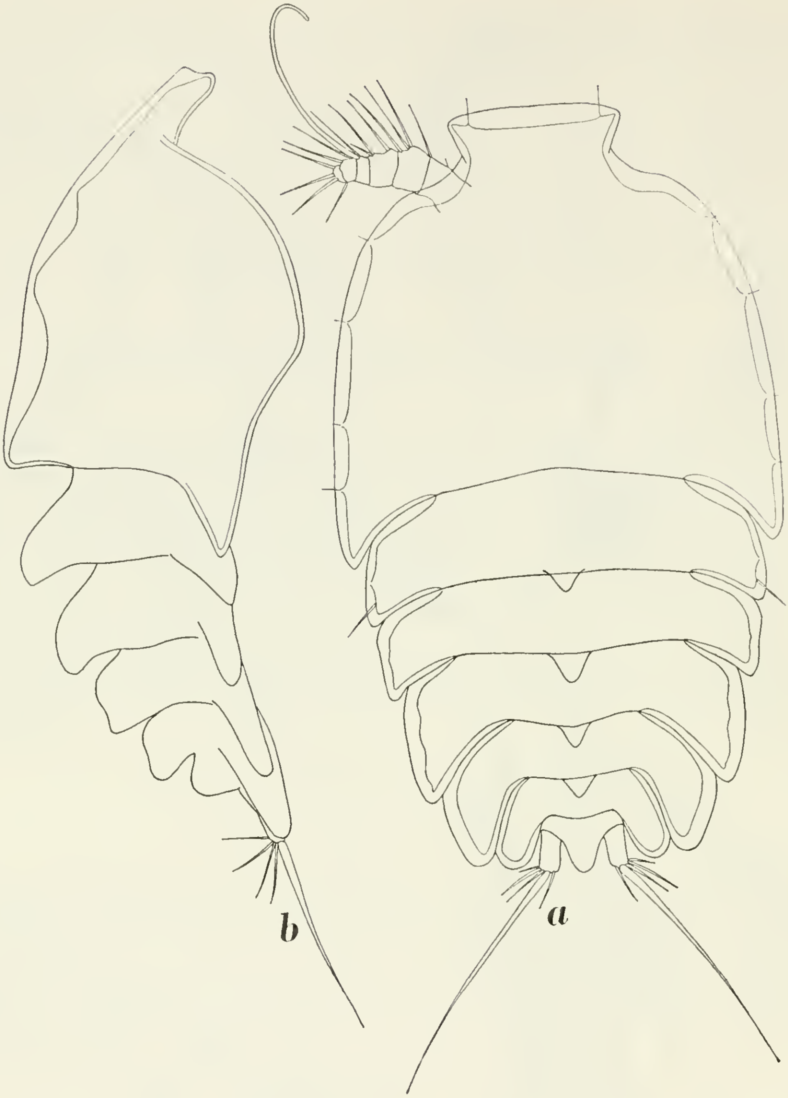

FIGURE 45.—*Peltidium purpureum* Philippi, loc. 638, juv. specimen: *a*, whole animal, dorsal view; *b*, same animal, lateral view after removal of antennules. (× 210.)

Body of general shape characteristic for genus. Head and 1st thoracic somite completely fused; 2nd to 5th thoracic somites with distinct, laterally produced epimeral plates. Cephalic somite anteriorly rounded; rostral base distinctly visible between basal parts of antennules and represents squarely cut off projection of cephalothorax.

Rostrum, as appears from lateral view, curves downward at almost square angle with rostral base, obliquely pointed (fig. 45*b*). Cephalic somite and 2nd thoracic somite on each side with 1 hair. Cephalic somite with distinct median longitudinal carina, terminating posteriorly in blunt tooth, not overlapping 2nd thoracic somite. 2nd to 5th thoracic somites and genital complex also provided with distinct carina, overlapping following somite very slightly, and rounded at apex. In lateral aspect these carinae give the animal a most distinctive appearance. Abdomen at this stage, in addition to 5th thoracic somite, composed of only two parts: genital and anal complexes. Genital complex provided with wing-shaped prolongations, directed laterocaudally.

Furcal rami cylindrical, twice as long as broad, with 5 marginal setae and 1 appendicular seta each. Seta 2 on each side lengthened and thickened, reaching half length of body; remaining setae short. Furcal rami reach as far as laterocaudal projections of genital complex.

After dissection, the antennules, antennae, mouth parts, and legs proved to be very undeveloped and are not described in detail here. Since I could not find a description of the copepodid stages of *Peltidium purpureum* in the literature, the identification of these juvenile specimens remains somewhat doubtful. It seems to me that a more complete material of this fairly common species, with the object of describing the developmental history, can easily be collected, with the result that I have refrained from a detailed description of these isolated juvenile specimens.

P. purpureum is widely distributed in the northern temperate Atlantic, on the European side, and in the Mediterranean. Details of its distribution can be found in Lang (1948, pp. 431, 432).

Peltidium intermedium A. Scott, 1909

FIGURES 46*a*,*b*, 47, 48

Peltidium intermedium A. Scott, 1909, p. 203, pl. 65 (figs. 6–10).—Sewell, 1940, pp. 143, 353, 355, 363.—Nicholls, 1941, p. 392.—Lang, 1948, p. 436, fig. 186 (no. 2).

MATERIAL.—Loc. 167–D–7, 1 ad. ♀, 0.77 mm.

DESCRIPTION.—The following is based on the above specimen; it has been dissected and the appendages mounted.

The general shape of the body corresponds very well with A. Scott's description (1909, p. 203), except for minor details in the armature. Body in dorsal aspect broadly ovate, with greatest diameter at posterior end of cephalic somite; proportion of length and diameter is 23:15. Head and 1st thoracic somite completely fused to form cephalic somite, which, as well as thoracic somites 2 to 5, is elevated in the middorsal line in lateral aspect. General outline of body as well as pattern of armature appears in figure 46*a*. Genital complex too is broadly winged; wings, caudally, are rounded and haired; laterally, cut off squarely and also haired.

Abdominal somites, in my specimen, completely retracted under genital complex and invisible from above, in contrast to A. Scott's specimen, where they are distinctly visible. This explains the difference in aspect of the posterior part of the body between the two specimens and, to a certain degree, the difference in length.

Rami of furca slightly more than twice as long as broad, cylindrical. There are 5 marginal, apical setae and 1 appendicular seta; 2nd thick and greatly lengthened, reaching half length of body; remaining setae and appendicular seta small. 5th seta inserts halfway along external border; it is very delicate (fig. 47*g*).

Rostrum a broadly based plate, basal part visible from above, rostral plate curving away from base suddenly, apex bluntly pointed (fig. 46*b*).

Antennules short, 7-segmented, setation shown in figure 47*a*. Aesthetasc on 3rd segment as well as on 4th segment; latter borne, together with 2 setae, on short, conical process, reaching as far as jointing between antennular segments 5 and 6. 7th segment long, twice as long as preceding. Antenna (fig. 47*b*) with basis and 1st endopodal segment separate. Basis with short, haired apical spine; exopodite 2-segmented, number of setae 1 and 3 respectively. One of apical setae with broadened edge, lancet-shaped. 1st endopodal segment with 1 internal seta; 2nd elongate, with almost basal internal seta and 2+6 terminal setae; one of terminal setae fine, 4 of apical setae geniculate. External margin spinulose, spinules terminating in 2 flattened teeth.

Mandibular praecoxa with big, flattened cutting edge, armed with 7 strong teeth and basal seta. Palp 2-segmented, only apical segment bears setae, numbering 4 (fig. 47*c*).

Maxillule with conspicuous arthrite, with 7 curiously modelled teeth. Coxa small, with small endite carrying 2 setae, almost hidden by basal endite (in the drawing, figure 47*d*, shown laterally in reflexed position). Basis with long endite, bearing 3 setae, and small exite, carrying 1 seta. No trace of endopodite nor exopodite.

Maxilla with small praecoxal and coxal endite, with 1 and 2 setae respectively. Basis with big endite, carrying strong spine, coalescent with endite, and seta. Endopodite vestigial, represented by 3 setae attached to basal endite (fig. 47*e*).

Maxillipede large, chelate. Coxa with subapical, haired seta. Basis big, internally and externally swollen, with rows of hairs along both margins. Curved setiform spine at internal margin, ⅓ length

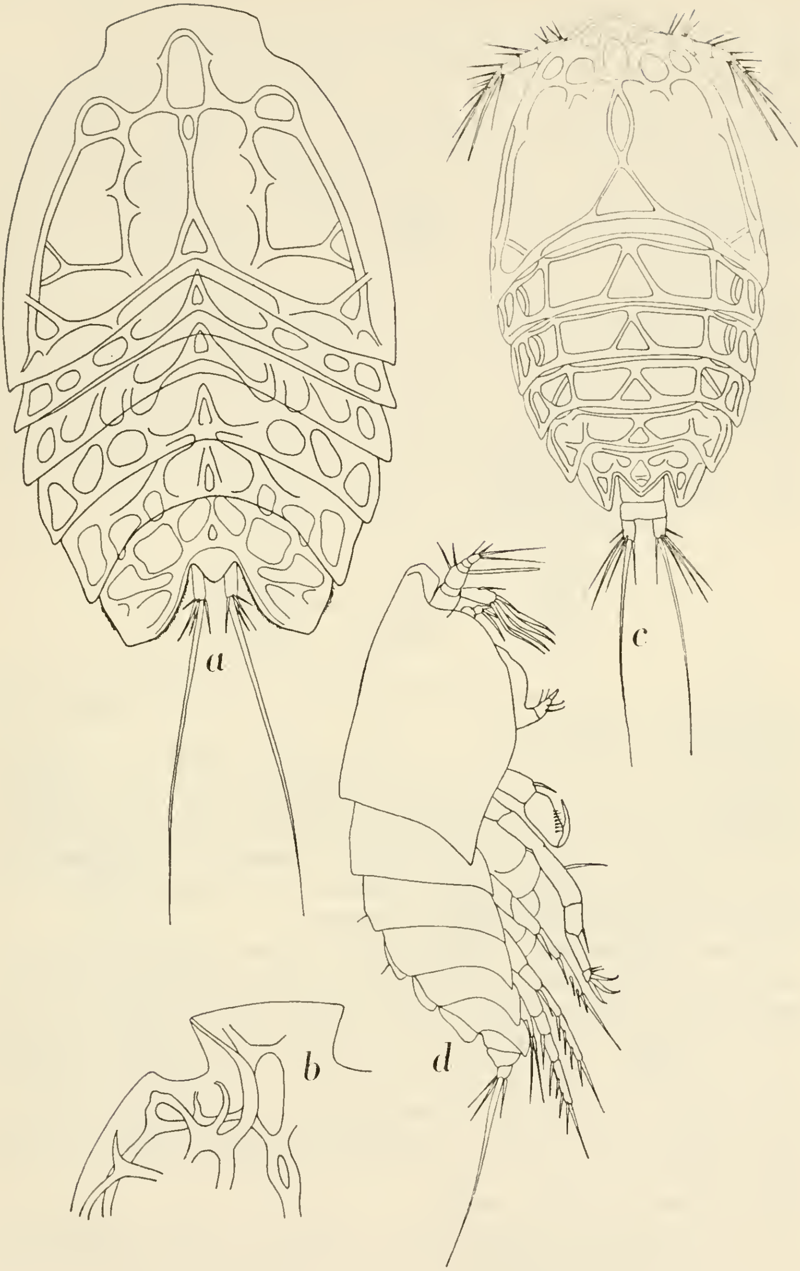

FIGURE 46.—*Peltidium intermedium* A. Scott, loc. 167–D–7, ad. ♀: *a*, whole animal, dorsal view; *b*, rostrum, after removal of antennules, in ventral view. *Peltidium exiguum* A. Scott, loc. 588, ad. ♀: *c*, whole animal, dorsal view; *d*, same animal, lateral view. (× 100.)

from apex. Endopodite unsegmented, curved, pointed, shorter than basis, smooth, with single seta almost at base (fig. 47*f*).

Leg 1 (fig. 48*a*) with haired lamella along external margin of coxa. Basis with haired external margin and internal and external seta. Exopodite inserting on distinct socle, 3-segmented. Apex of 1st exopodal segment reaching as far as apex of 2nd endopodal segment, with 1 external seta. 2nd exopodal segment 1¼ length of 1st, with internal and external seta. Terminal 3rd exopodal segment small, with two lateral, curved spinules and 2 apical, big claws, differing in size. Endopodite 2-segmented: 1st segment with haired external margin and strong internal seta, placed on distinct socle and reaching apex of 2nd segment; 2nd endopodal segment with haired margins, carrying 4 setae, 2 apical and 2 internal. Apical setae fine, internal setae with thickened base, gradually flattening and provided with thin lamellar edge, distinctly visible only in stained preparations.

The details of legs 2 to 4 appear from figures 48*b–d*, the setal formula, and the following notes. Setal formula:

	endopodite	*exopodite*
leg 1	1.2.120	1.1.223
leg 2	1.2.320	1.1.323
leg 4	1.2.220	1.1.323

Legs 2 to 4 have transversally elongated bases and 3-segmented exopodites and endopodites.

Leg 5 (fig. 48*e*) with well-developed, conical, external lobe of baso-endopodite, reaching halfway along exopodite, not quite reaching base of internal seta and carrying fine seta. Baso-endopodite very short, with strong seta and fine, hairlike seta. Exopodite with 5 marginal setae: 3 (2 fine and nude, 1 plumose and strong) apical; 2 placed along internal border that are long and plumose.

Color whitish opaque, without a trace of eyes or pigmented spots.

REMARKS.—*Peltidium intermedium* originally was described from a single female specimen, 0.87 mm. long, captured by the Siboga Expedition in the Malay Archipelago, off Saleyer, among surface plankton (A. Scott, 1909). The specimen apparently was dissected and the slides were lost. But for small details in the armature of the carapace, which armature may be slightly variable, the present specimen agrees very well with A. Scott's description, especially the shape of the body and the structure of legs 1 and 5.

The Ifaluk specimen was obtained in washings of the alga *Halimeda* from the bottom of the ship's passage, at a depth of 13 to 14 feet, between Fallalap and Ella islets in Ifaluk Atoll.

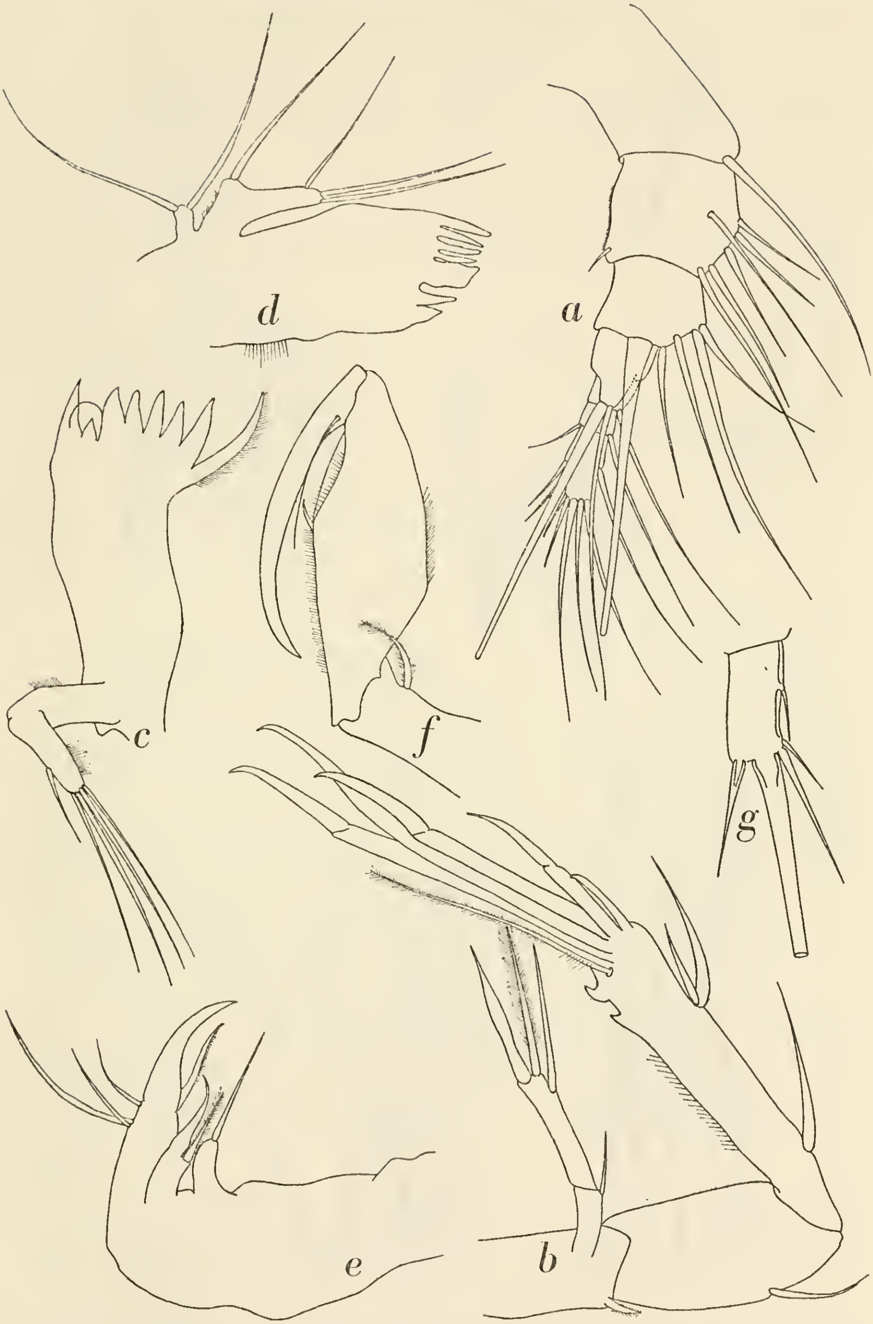

FIGURE 47.—*Peltidium intermedium* A. Scott, loc. 167–D–7, ad. ♀: *a*, antennule; *b*, antenna; *c*, mandible; *d*, maxillule; *e*, maxilla; *f*, maxillipede; *g*, left furcal ramus, with setae, ventral aspect. (*a-e*, *g*, × 460; *f*, × 275.)

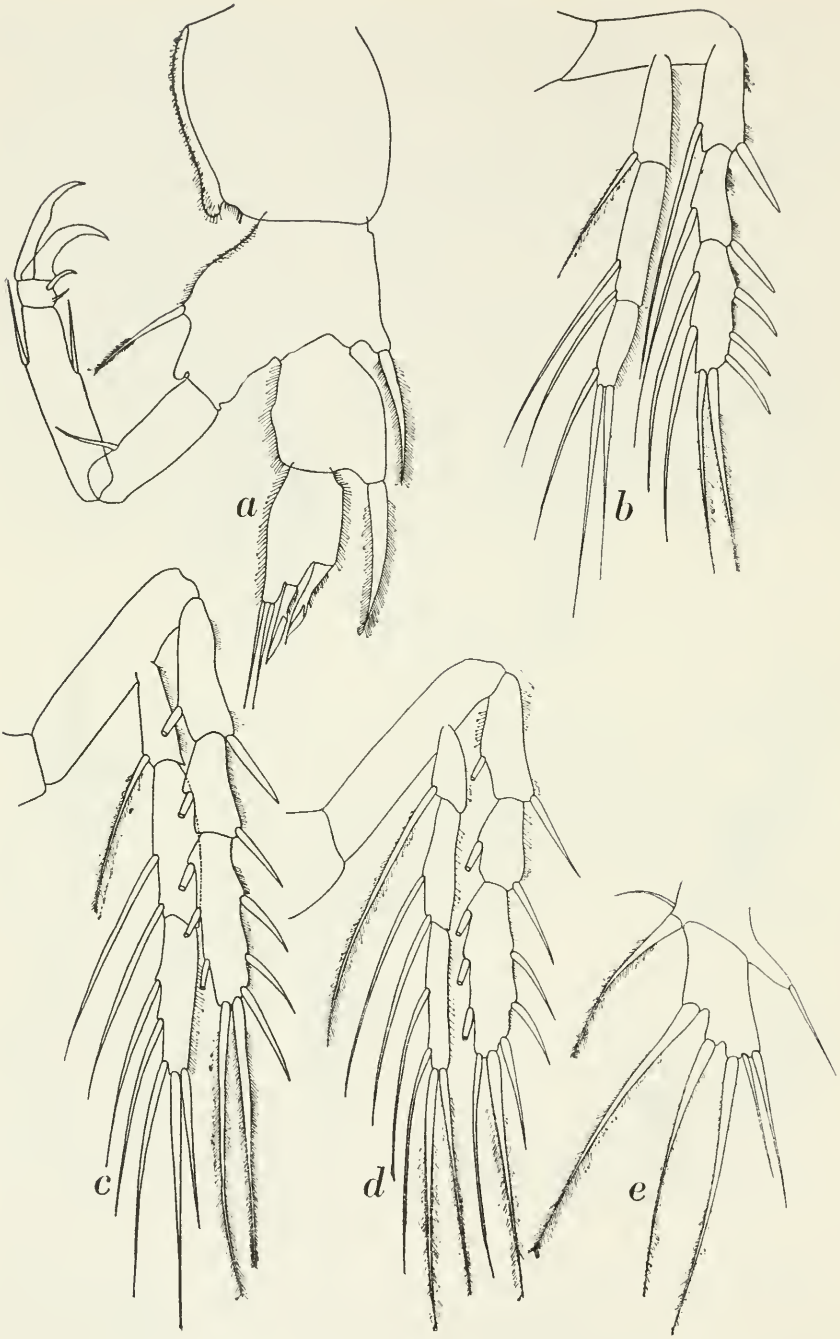

Figure 48.—*Peltidium intermedium* A. Scott, loc. 167–D–7, ad. ♀: *a*, leg 1; *b*, leg 2; *c*, leg 3; *d*, leg 4; *e*, leg 5. (*a–d*, × 275; *e*, × 460.)

***Peltidium exiguum* A. Scott, 1909**

FIGURES 46*c,d*, 49, 50

Peltidium exiguum A. Scott, 1909, p. 204, pl. 65 (figs. 11–15).—Sewell, 1940, pp. 143, 355, 363, 364.—Nicholls, 1941, p. 392.—Lang, 1948, p. 436, fig. 186 (no. 3).

MATERIAL.—Loc. 588, 2 ad. ♀♀, 1 ov., 0.65 and 0.66 mm.; 1 juv. specimen, 0.48 mm.

DESCRIPTION.—The following is based on the specimen (nonovigerous) of 0.66 mm. length, which also has been dissected and mounted.

Adult female, total length 0.66 mm.; greatest diameter 0.36 mm.; length of longest furcal seta 0.42 mm.

Body strongly built, compressed dorsoventrally; in general outline broadly ovate, very broadly rounded anteriorly (accentuated by curious structure of rostrum), reaching greatest diameter at end of cephalic somite and gradually tapering posteriorly (fig. 46*c*). Head and 1st thoracic somite completely fused to form cephalic somite, which is as long as combined length of thoracic somites 2 to 5. Epimeral plates of all thoracic somites (including 5th thoracic or 1st abdominal portion and genital complex) with well-developed and laterally produced epimeral plates. In lateral aspect, posterolateral end of cephalic somite and epimeral plates of thoracic somites 2 to 5 and of genital complex are pointed (fig. 46*d*); points directed caudally. No trace of longitudinal median carina on cephalic somite, but carina gradually develops on thoracic somites 3 to 5 and on genital complex and distinctly noticeable in lateral aspect. On 3rd and 4th somites carina preceded by small tubercle carrying hair. All somites and genital complex with characteristic pattern of sclerotized ridges, structure and position of which can best be seen in figure 46*c*.

Genital complex, which as mentioned above has distinct epimeral plates, apparently results from fusion of abdominal somites 1 to 3; it is caudally produced in the middorsal line; produced part rounded and covering part of 4th abdominal somite. Caudally produced epimeral plates reach as far as middle of anal somite. Anal somite about as long as preceding somite, anal flap invisible, caudally somite is produced into knob in middorsal line, situated between rami of furca (fig. 50*a*).

Furcal rami parallel, each nearly twice as long as broad. Five marginal setae and 1 appendicular seta. Seta 2 is lengthened and thickened; it has a slightly swollen base. Remaining setae small; 5th inserts halfway along external border.

Rostrum broad, curved, platelike structure in front of cephalon. Broad lateral sweeps of cephalic somite and downward curve of rostrum make it almost invisible from above, more so since rostral base is curved and curve fits perfectly into outline of cephalon; its true presence readily discovered in lateral aspect (fig. 49*a*).

Antennules 6-segmented, reduction resulting apparently from fusion of 4th and 5th segments, which still have partly developed jointing at internal side. Setation of antennule represented in figure 49*b*; aesthetascs occur on 3rd and 4th free segments.

Antenna (fig. 50*b*) as in *Peltidium intermedium*, but with differently shaped setae on endopodite. On exopodite there is no lancet-shaped seta, but one of the apical setae is strong.

Cutting edge of mandibular praecoxa with small teeth and fine basal seta. Structure appears in figure 49*c*. Palp as in *P. intermedium*.

Maxillule as in preceding species, not described in detail.

Maxilla differing from that of *P. intermedium* in structure of coxal endite, which has 3 appendages: fine seta, seta with thickened base, and flattened dagger-shaped spine (fig. 49*d*).

Maxillipede (fig. 49*e*) with strongly swollen basis, with row of spinules along internal margin; no curved spine at that margin as in preceding form. Endopodite short, 1-segmented, curved process, reaching ⅔ length of basis, without setae.

Leg 1 (fig. 50*c*) with internal, spinulose lamella along external margin, internal margin haired. Strongly thickened trabecle in coxa. Basis with internal and external seta and socle bearing 3-segmented exopodite; endopodite 2-segmented. 1st exopodal segment with external seta; 2nd exopodal segment twice length of 1st, with internal and external seta. 3rd exopodal segment small, with 2 small external claws and 2 big, strongly curved spines of unequal size at apex. Endopodal segments of same length, 1st with strongly plumose internal seta. Four appendages on 2nd endopodal segment: 2 apical setae and 2 internal setiform spines with broadly curved lamella, composed of closely adpressed hairs and very transparent, with the result that this structure easily is overlooked in unstained preparations.

Legs 2 to 4 (figs. 50*d–f*) almost as in *P. intermedium*, with the following setal formula:

	endopodite	*exopodite*
leg 2	1.2.120	1.1.223
leg 3	1.2.320	1.1.323
leg 4	1.2.220	1.1.323

Leg 5 with greatly lengthened external lobe of baso-endopodite, reaching distal third of exopodite, with fine seta. Baso-endopodite small, almost vestigial, with strong seta and fine hairlike seta. Exopodite 4 times as long as broad, with 5 marginal setae: 3 (2 fine, 1 strong) at apex and 2 strong setae at internal margin (fig. 49*f*).

Remarks.—The present specimens show perfect agreement with A. Scott's description and figures except for the structure of the 2nd

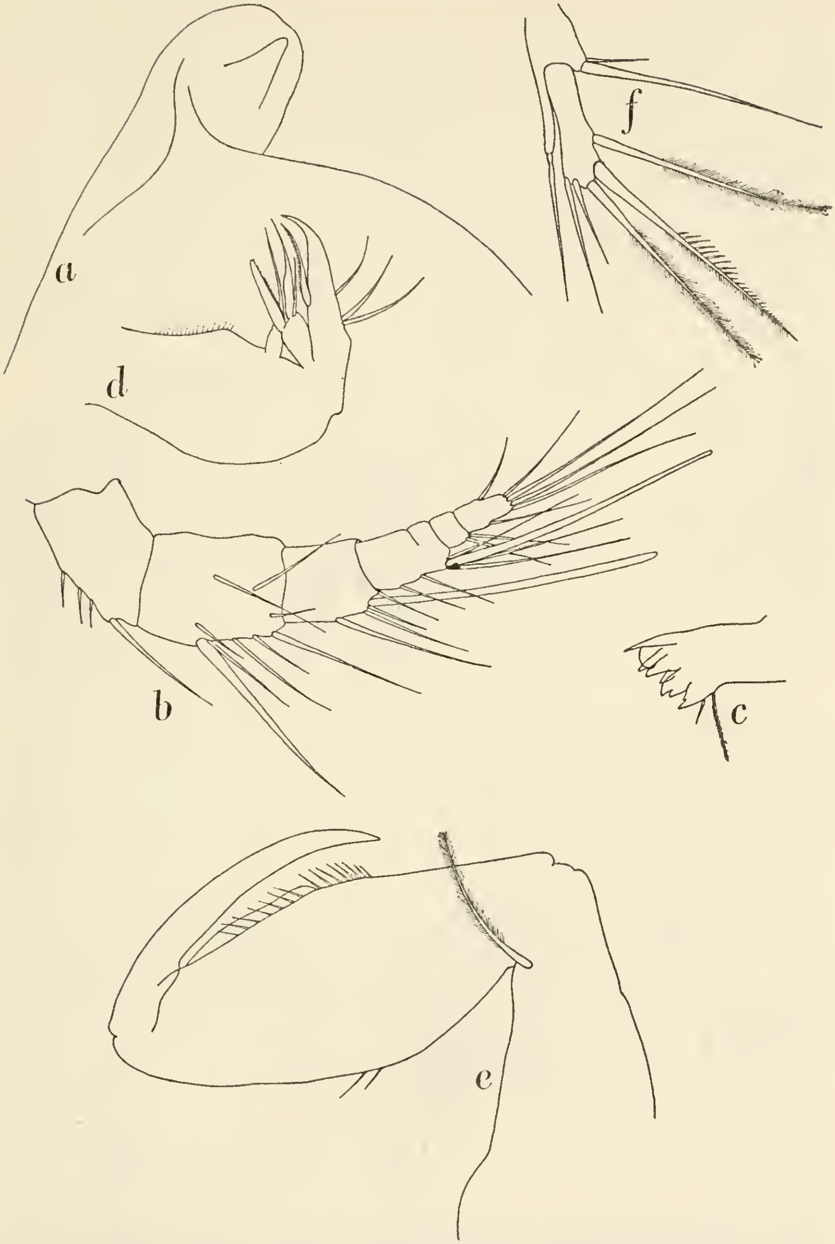

Figure 49.—*Peltidium exiguum* A. Scott, loc. 588, ad. ♀: *a*, rostrum, oblique view from right side after removal of antennules; *b*, antennules; *c*, cutting edge of mandibular praecoxa; *d*, maxilla; *e*, maxillipede; *f*, leg 5. (*a*, × 275; *b–e*, × 460.)

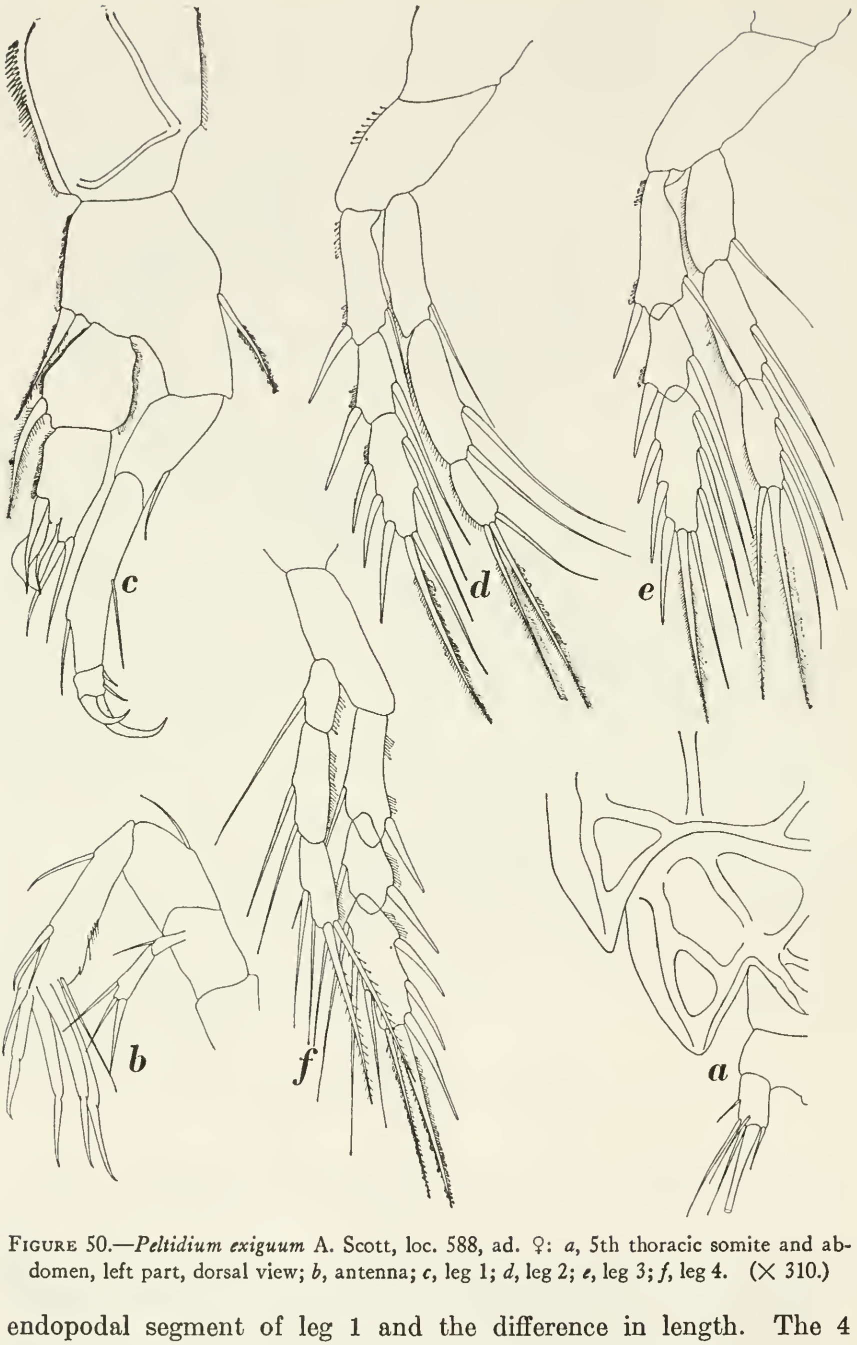

Figure 50.—*Peltidium exiguum* A. Scott, loc. 588, ad. ♀: *a*, 5th thoracic somite and abdomen, left part, dorsal view; *b*, antenna; *c*, leg 1; *d*, leg 2; *e*, leg 3; *f*, leg 4. (× 310.)

endopodal segment of leg 1 and the difference in length. The 4 appendages of the above-mentioned segment, according to A. Scott's description and figure (pl. 65, fig. 14) are equally developed, but I have drawn attention already to the fact that the hyaline lamella on the 2 internal setae is overlooked very easily, which seems the more likely in A. Scott's figure since he probably made his drawings from an unstained specimen. There is also a slight difference in the structure of leg 5; in Scott's specimen the two fine apical setae of the exopodite appear to have been of equal length; here they are distinctly unequal.

P. exiguum originally was described from a single female specimen found in washings of marine invertebrates dredged at a depth of 13 meters off Pulu Jedan in the Aru Islands by the Siboga Expedition. The present specimens are from sand samples taken some 40 feet from the reef margin at Falarik in the Ifaluk Atoll.

Family Thalestridae G. O. Sars, 1905

In the discussion of the Ifaluk representatives of this family I will base myself on Lang's monograph for reasons of stability. The division of such a large family always will depend largely upon the personal opinion of the investigator concerned. Lang's division, which is repeated below with the new genera described, seems quite sound though, unfortunately, the reasons for substitution of a new name, etc., cannot always be lifted distinctly from the lengthy discussions. At Lang's suggestion the family is split into four subfamilies.

Subfamily Thalestrinae G. O. Sars, 1905: Genera *Thalestris* Claus, 1863 (type species *T. longimana* Claus, 1863), *Amenophia* Boeck, 1864 (type species *A. peltata* Boeck, 1864), *Parathalestris* Brady and Robertson, 1873 (type species *Thalestris clausii* Norman, 1868), and *Phyllothalestris* G. O. Sars, 1905 (type species *Thalestris mysis* Claus, 1863).

Subfamily Rhynchothalestrinae Lang, 1948: genera *Rhynchothalestris* G. O. Sars, 1905 (type species *Thalestris rufocincta* Brady,1880), and *Pelthestris* (type species *P. tripartita* Monard, 1924).

Subfamily Dactylopusinae Lang, 1936: genera *Diarthrodes* Thomson, 1882 (type species *D. novaezealandiae* Thomson, 1882), *Eudactylopus* A. Scott, 1909 (type species *Dactylopus latipes* T. Scott, 1894=*E. andrewi* Sewell 1940), *Dactylopodopsis* G. O. Sars, 1911 (type species *D. dilatata* G. O. Sars, 1911), *Dactylopusioides* Brian, 1928 (type species *Dactylopus macrolabris* Claus, 1866=*Dactylopusioides stampaliae* Brian, 1928), *Dactylopusia* Norman, 1903 (type species *Dactylopus tisboides* Claus, 1863), *Paradactylopodia* Lang, 1948 (type *Dactylopus latipes* Boeck, 1864), *Neodactylopus* Nicholls, 1945 (type species *N. cyclopoides* Nicholls, 1945), and *Diarthrodella* Klie, 1949 (type species *D. orbiculata* Klie, 1949).

Subfamily Pseudotachidiinae Lang, 1936: genera *Idomene* Philippi, 1843 (type species *I. forficata* Philippi, 1843), *Pseudotachidius* T.

Scott, 1898 (type species *P. coronatus* T. Scott, 1898), and *Dactylopodella* G. O. Sars, 1905 (type species *Dactylopus flavus* Claus, 1866).

The following genera are of uncertain standing: *Flavia* Brady, 1899 (for *F. crassicornis* Brady, 1899), *Dactylopina* Brady, 1910 (for *D. villosa* Brady, 1910), *Mawsonella* Brady, 1918 (for *M. typica* Brady, 1918), and *Tisemus* Monard, 1928 (for *T. pulchellus* Monard, 1928).

I have only provisionally accepted Nicholls' genus *Neodactylopus*, which seems to be allied closely to, and probably even to be identical with, *Eudactylopus* A. Scott, as defined by Lang (1948, p. 559).

The genus *Dactylopusia* was substituted by Norman (1903 p. 368) for *Dactylopus* Claus, 1863 (preoccupied by *Dactylopus* Gill, 1859). Norman designated as the type of his genus the species *Dactylopus strömii* (Baird, 1834), which thereby also becomes the type of *Dactylopus* Claus, 1863, for which genus at that time no type was indicated.

Claus (1863, p. 126) mentioned *Dactylopus strömii* as the first of the species listed by him as referable to *Dactylopus*. His identification, however, is incorrect. Baird's original figure leaves no doubt that his "*Cyclops Strömii*" is referable to the Laophontidae and not to the Thalestridae (Baird, 1837, p. 330, pl. 8, figs. 23–25). As Sars (1905, p. 129) pointed out, the material which Claus referred to Baird's species actually belongs to a new species, described by him as *Dactylopusia vulgaris* (loc. cit., p. 129, pl. 79, fig. 1). It is clear that Norman, when designating *Dactylopus strömii* as the type of *Dactylopusia*, meant the species identified by Claus as such, and Norman's type designation consequently is based on a misidentified species. A strict application of the International Rules of Zoological Nomenclature makes *Cyclops strömii* Baird the type of *Dactylopusia*, necessitating the transfer of Norman's genus from the Thalestridae to the Laophontidae. As this will cause no end of confusion, the International Commission on Zoological Nomenclature will be asked to correct under their plenary powers the consequences of Claus' and Norman's misidentification and to indicate under these powers, as the type of the genus *Dactylopusia* Norman, the species *D. vulgaris* G. O. Sars, 1905. Pending the decision of the International Commission, the name *Dactylopusia* will be used here in the currently accepted sense.

Lang (1944, 1948) entirely split up the old genus *Dactylopusia* and even went so far as to drop that name altogether, replacing it, without obvious reason, with the new name *Dactylopodia*—"Doch habe ich jetzt die Gattung *Dactylopusia* umgetauft und einige Arten herausgebrochen, die ich in einer Gattung *Paradactylopodia* vereinige" (1944, p. 12). There seems to be no reason for a new name and

Dactylopodia may disappear as a junior objective synonym of *Dactylopusia.*

Genus *Diarthrodes* Thomson, 1883

Diarthrodes nobilis (Baird, 1845)

FIGURES 51, 52

Arpacticus nobilis Baird, 1845, p. 155.
Westwoodia nobilis.—Vàtova, 1928, p. 359.—Marine Biological Association, 1931, p. 163.—Fraser, 1936, p. 26.—Marine Biological Association, 1957, p. 167.
Parawestwoodia nobilis.—Sewell, 1940, pp. 236, 352, 357, 366, 369, 370, 372, 375.
Diarthrodes nobilis Dahl, 1948, p. 95.—Lang, 1948, p. 529, fig. 216.—Klie, 1949, p. 122.—Maghraby and Perkins, 1956, p. 491.—Roe, 1960, p. 279.

MATERIAL.—Loc. 590, 1 ad. ♀, 0.43 mm. length.

DESCRIPTION.—The following is based on the above-mentioned specimen, which has been dissected and the appendages mounted.

Adult female, total length 0.43 mm.; greatest diameter 0.18 mm.; length of longest furcal seta 0.29 mm.

Body strongly built, with well-developed, ovoid cephalothorax and short abdomen; proportional length of cephalothorax and abdomen is 20:9. In dorsal view body moderately slender, with marked division between cephalothoracic and abdominal parts (fig. 52*a*). Head and 1st thoracic somite completely fused to form cephalic somite, which is longer than combined lengths of thoracic somites 2–4, in proportion of 15:9, measured in lateral aspect. Line of back, in lateral view, broadly curved, curving smoothly into well-developed rostrum, which points almost straight down (fig. 51*a*). Rostrum triangular with rounded apex, as long as first two antennular segments, in dorsal aspect clearly visible and separated from cephalic somite by deep groove. Lateral margins of thoracic somite well produced, especially anterolateral corners, covering greatest part of oral appendages. Epimeral plates of thoracic somites 2 to 4 well developed, rounded in lateral view, in 3rd somite slightly, and in 4th somite strongly, backwardly produced.

5th thoracic somite small, invisible from above but distinctly visible in lateral aspect. Abdominal somites 1 and 2, forming genital somite, are distinctly separate in this specimen; somites 1 and 4, and 2 and 3, have same length, latter being largest. Anal somite longest somite of abdomen, with very broadly rounded, hyaline anal operculum, placed at distal end of somite. No spinules on dorsal surfaces of abdominal somites, but spinules occur on ventrolateral surfaces of somites 2, 3, 4, and on lateral aspect of anal somite near insertion of furcal rami.

Furcal rami much broader than wide (proportion 7:3); there are 5 marginal setae and one appendicular seta on each ramus. Seta

1, 4, 5, and appendicular seta small, setae 2 and 3 lengthened and thickened, especially the 2nd. None of setae swollen at base. Internal and external margins of furcal rami with some dispersed spinules (fig. 51*b*).

Antennules very short, 5-segmented, 3rd segment long, with small apical conical process, bearing aesthetasc and 2 setae. Setation represented in figure 51*c*.

Antenna (fig. 51*d*) with 3-segmented exopodite, segment 2 very small. There are 2 setae on segments 1, 1 on segment 2, 4 on segment 3. Allobasis with strong internal seta which appears to have been overlooked by Sars.

Mouth parts in complete agreement with Sars' description and figures (1906, p. 140, pls. 85, 86); they will not be described in detail here. Leg 1 (fig. 52*b*) with 1-segmented endopodite and 3-segmented exopodite. Coxa with spinulose internal tubercle. Basis with strong internal and external spine; insertion of external spine and of exopodite fringed with spinules. 1st exopodal segment styliform, 5 times as long as broad, seta at external margin slightly above middle of that margin. Segments 2 and 3 small, jointing indistinct. 2 hooked spines of very unequal size on apical segment. Endopodite half length of 1st exopodal segment, with 6 appendages: fine seta at external border and 5 spiniform setae dispersed along apex and internal border. In addition, there is an internal swelling on the endopodite set with spinules.

Legs 2 to 4 with 3-segmented endopodites and exopodites. The structure of these legs appears clearly from figures 51*e*, 52*c*,*d*; the setal formula is:

	endopodite	*exopodite*
leg 2	1. 2. 221	1. 1. 223
leg 3	1. 2. 321	1. 1. 323
leg 4	1. 1. 221	1. 1. 323

In the structure of the legs also there is complete agreement with Sars' description and figures (loc. cit.).

Exopodite of leg 5 (fig. 52*e*) small, rounded, about as long as baso-endopodite. External lobe of baso-endopodite well developed, slender, with fine seta. Exopodite with 5 setae, median seta fine. Baso-endopodite with 5 setae: group of 2 external and 3 internal setae. Color completely faded, greenish, no eye or pigmented spot visible.

Remarks.—The present female specimen agrees perfectly with Sars' description and figures (1906) of northern representatives of this species. Lang gives the length of female specimens as being from 0.63 to 0.9 mm.; these measurements must be based chiefly upon the Atlantic specimen since *Diarthrodes nobilis* has its main area of distribution in tropical, subtropical, and boreal parts of the

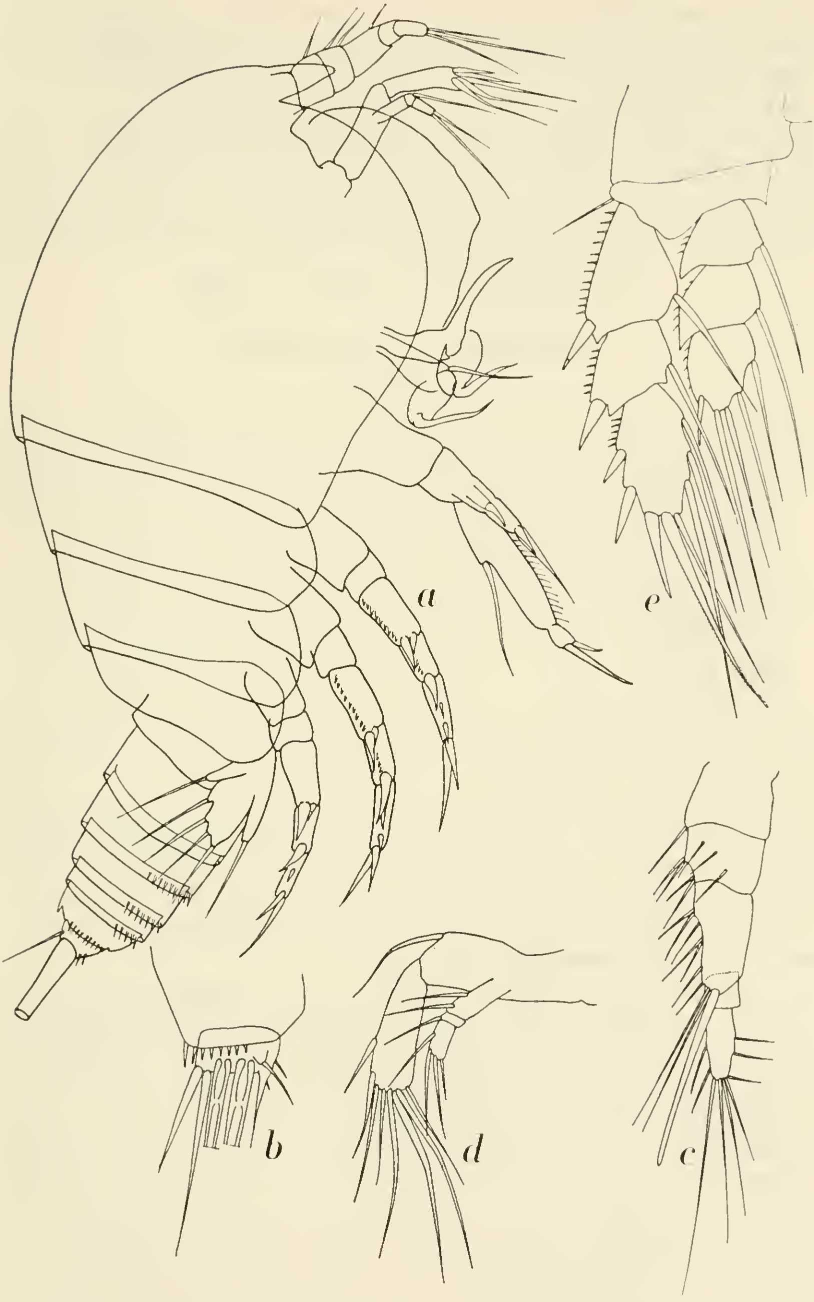

FIGURE 51.—*Diarthrodes nobilis* (Baird), loc. 590, ad. ♀: *a*, whole animal, lateral view from right side: *b*, left furcal ramus with setae, dorsal view; *c*, antennule; *d*, antenna; *e*, leg 4. (*a*, × 275; *b–e*, × 460.)

Atlantic, penetrating even into Arctic seas. The distribution in the Atlantic is summarized by Sewell (1940, p. 236) and is given extensively by Lang (1948, p. 530); it occurs along American and European coasts from Franz Joseph Land to Madeira and the Canary Islands. The only Pacific record available is Addu Atoll in the Maldive Archipelago (Sewell, 1940), where a single specimen (no sex and length given) was found in weed washings. At Ifaluk a single specimen occurred in a sand sample, taken some 100 feet from the reef margin.

Genus *Dactylopusia* Norman, 1903

Dactylopusia tisboides (Claus, 1863)

FIGURES 53–55

Dactylopus tisboides Claus, 1863, p. 127, pl. 16 (figs. 24–28).—Klie, 1949, p. 122.
Dactylopusia tisboides.—Vàtova, 1928, p. 182.—Marine Biological Association, 1931, p. 162.—Fraser, 1936, pp. 25, 26.—Nicholls, 1939, p. 256.—Sewell, 1940, pp. 127, 222, 352, 353, 357, 361, 363, 366, 367, 369, 370, 373–376.—Nicholls, 1941b, p. 71; 1944a, p. 489; 1945, p. 1.—Caspers, 1951, p. 66.—Gallingani, 1952, p. 75.—Marine Biological Association, 1957, p. 166.
Dactylopodia tisboides.—Lang, 1944, p. 13.—Dahl, 1948, p. 95.—Lang, 1948, p. 545, figs. 222 (no. 1), 223 (no. 1).—Noodt, 1955a, p. 203.—Maghraby and Perkins, 1956, p. 491.—Roe, 1958, p. 228.—Wieser, 1959, p. 107.—Roe, 1960, p. 279.

MATERIAL.—Loc. 425, 1 ad. ♀, 0.38 mm.; 2 ad. ♂♂, 0.38 and 0.39 mm. Loc. 431, 1 ad. ♂, 0.35 mm. Loc. 590, 1 ad. ♀, 0.39 mm. Loc. 638, 1 ad. ♂, 0.38 mm.

DESCRIPTION.—The following is based on the female specimen from locality 590 and a male specimen of 0.39 mm. length from locality 425; in addition, a female specimen from locality 425 has been used. All specimens have been dissected and the appendages mounted.

Adult female, total length 0.39 mm.; greatest diameter 0.14 mm.; length of longest furcal seta 0.38 mm.

Body strongly built, compact, with ovoid cephalothorax and short abdomen (proportion 9:4). Greatest diameter of cephalothorax at end of cephalic somite, broadly rounded anteriorly, gradually narrowing posteriorly, not sharply separated from abdomen, particularly in contracted specimens without sharp delimitation between these two regions of the body (figs. 53*b*, 54*a*). Head and 1st thoracic somite fused to form cephalic somite, which is longer than combined lengths of thoracic somites 2 to 4. Line of back, in lateral view, broadly rounded and curving without interruption into rostrum. In dorsal view, rostrum separated from cephalic somite by shallow groove. Rostrum a small, triangular structure with rounded apex, as long as 1st antennular segment. Lateral parts of cephalic somite slightly produced to cover basal parts of oral appendages, laterocaudally

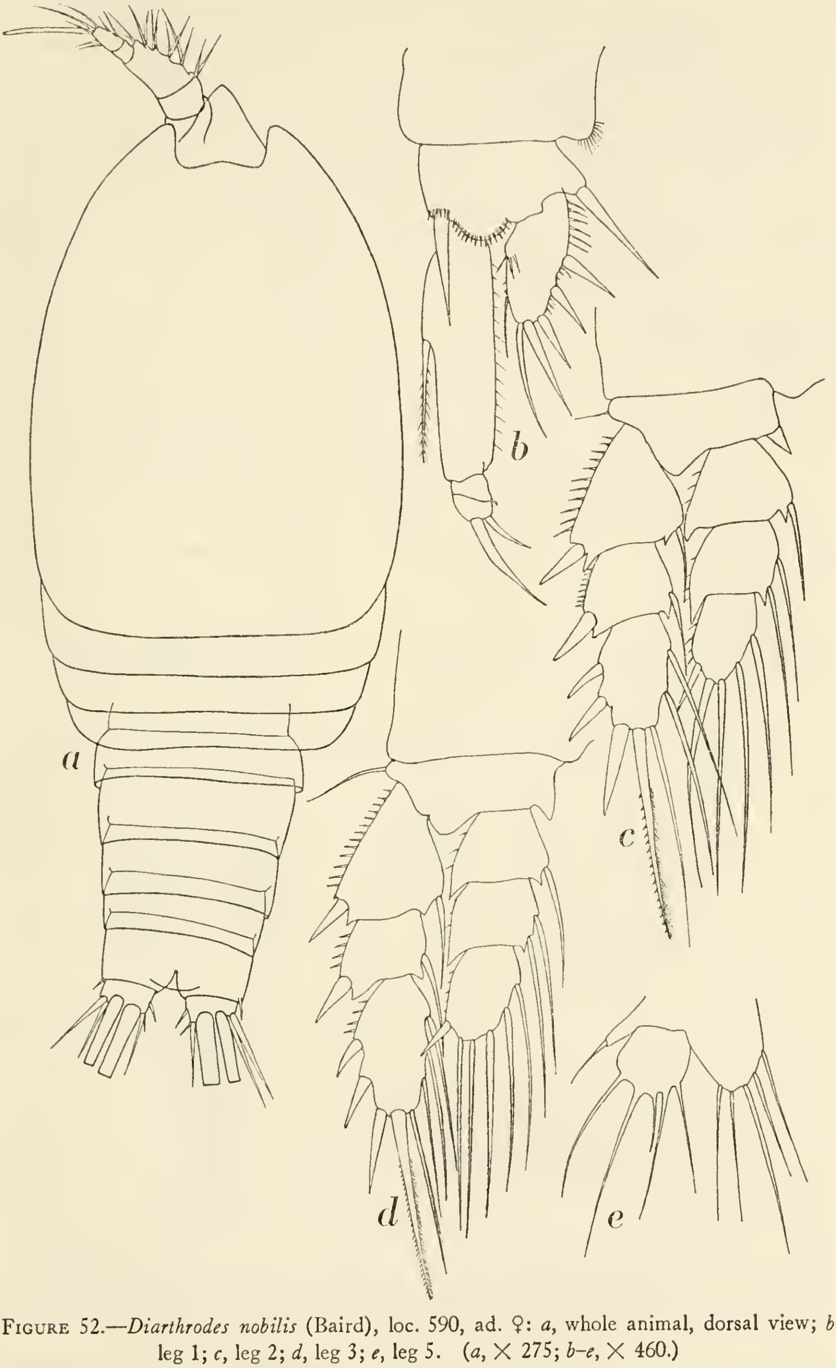

FIGURE 52.—*Diarthrodes nobilis* (Baird), loc. 590, ad. ♀: *a*, whole animal, dorsal view; *b*, leg 1; *c*, leg 2; *d*, leg 3; *e*, leg 5. (*a*, × 275; *b–e*, × 460.)

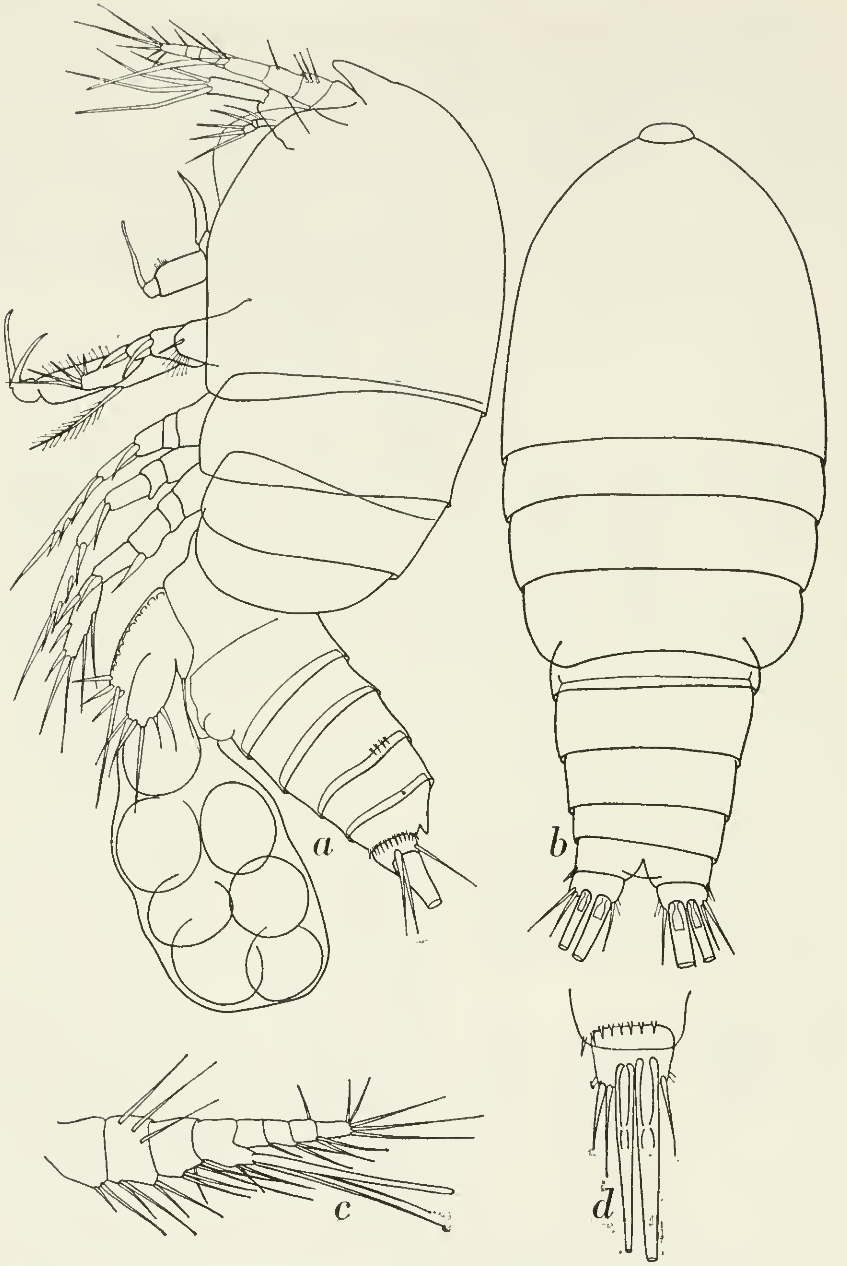

Figure 53.—*Dactylopusia tisboides* (Claus), loc. 590, ad. ♀: *a*, whole animal, lateral view from left side; *b*, same animal, dorsal view; *c*, antennule; *d*, right furcal ramus with setae, ventral view. (*a*, *b*, × 275; *c*, *d*, × 460.)

slightly produced. Epimeral plates of somites 2 to 4 rounded; somites of nearly same length (fig. 53*a*).

5th thoracic somite scarcely visible from above, represented by very narrow strip in front of genital somite. Genital somite resulting from fusion of abdominal somites 1 and 2; line of fusion visible in dorsal view but scarcely in lateral aspect. Genital somite with almost straight lateral walls, tapering slightly distally. In the present specimen the abdominal somites are very strongly contracted (fig. 53*b*) but in the specimen from locality 425 the genital somite is 1½ times as long as the 3rd abdominal somite, this again slightly longer than 4th, while the anal somite is very short (fig. 54*a*). Spinules occur only at the dorsolateral surface of the 3rd abdominal somite and at the insertion of the furca on the anal somite. Anal flap not visible dorsally.

Furcal rami parallel, rami as long as broad or slightly broader, with 5 marginal setae and 1 appendicular seta (fig. 53*d*). Setae 1, 4, and appendicular seta fine and short, seta 5 very short and spiniform. Setae 2 and 3 lengthened and thickened, especially 2nd, which reaches length of body. Both setae 2 and 3 are swollen slightly at base. In addition to setae there are some spinules on the external wall of each ramus.

Antennules (figs. 53*c*, 54*b*) 8-segmented, reaching halfway length of cephalothorax. Setation and length of segments can be taken from figure 53*c*. The 4th segment is not lengthened but has a conical process bearing an aesthetasc and 2 setae.

Antenna and mouth parts agree completely with previous descriptions, particularly those of Sars (1905, p. 126, pls. 77, 78, fig. 1) and will not be described or figured. Exopodite of antenna 3-segmented; number of setae on these segments is 2, 1, and 4, respectively.

Leg 1 (fig. 55*a*) with 3-segmented exopodite and endopodite. Coxa with spinulose tubercle at external margin. Spine at internal margin of basis strong, at its base with a fringe of spinules; spine at external margin smaller, setiform. Spinules also occur near insertion of endopodite on basis. Exopodite ⅔ length of 1st endopodal segment. 2nd exopodal segment 2½ times as long as wide, with seta at internal and spine at external margin. 3rd exopodal segment notably small, with total of 5 appendages. Seta on 1st endopodal segment inserting halfway along that margin, segment styliform, 4½ times as long as wide; external margin spinulose.

Legs 2 to 4 with 3-segmented exopodites and endopodites. Particulars of these legs can be taken from figures 54*c*, 55*b*,*c*; the setal formula is:

	endopodite	*exopodite*
leg 2	1.1.221	1.1.223
leg 3	1.2.321	1.1.323
leg 4	1.2.221	1.1.323

2 setae at internal margin of 2nd endopodal segment of leg 4, proximal seta very short.

Leg 5 (fig. 55*d*) with small, broadly ovate exopodite, bearing 6 setae; no internal chitinous ridges or trabuculae present. Baso-endopodite at apex truncate, reaching apex of exopodite; internal margin straight, with number of chitinous ridges, external margin spinulose. 5 marginal setae, 2 of which are lengthened.

Specimens almost transparent, faintly greenish, without pigment or eye. Female carries egg sac, fastened to genital somite by means of yellow pad; ball composed of 10 eggs.

Adult male, total length 0.39 mm.; length of longest furcal seta 0.30 mm.

General appearance of the male same as the female but for the following points:

1. Proportional length of cephalothorax and abdomen is 17:9; thorax more slender; cephalic somite with less produced lateral walls, with the result that mouth parts are uncovered; epimeral plates of thoracic somites 2 to 4 less produced, broadly rounded. Rostrum of same appearance as in female, but heavier.

2. Abdomen, at least in this specimen, less contracted, with the result that whole appearance of animal is slenderer. Abdominal somites 1 and 2 fully separate, furca as in female.

3. Antennules haplocerate, 9-segmented. Segments 1 and 2 fairly big, 3 and 5 small. Segment 4 only slightly swollen, with distinct tooth. There is an asthetasc on segment 6, accompanied by 2 setae; the apical 3 segments (7–9) are small and slender (fig. 54*d*).

4. Antenna, mouth parts and legs 1 to 4 as in female, with exception of endopodite of leg 2, which is modified and 2-segmented. 1st segment normally developed; 2nd segment with curiously formed external and apical spines. In addition, there is a short external seta and 2 long internal setae (fig. 54*e*).

5. Leg 5 small, exopodite cordate, attached to baso-endopodite with broad base, with 5 setae. Baso-endopodite rounded, reaching apex of exopodite, with 3 setae (fig. 54*f*).

Color as in female.

Remarks.—The descriptions given above and the figures correspond very well with Sars' account (loc. cit.) of this form. The variability in length of the female is apparently considerable; Lang (1948, p. 546) gives measurements of the female varying between 0.49 and 1.5 mm. (the male is generally smaller than the female). Sewell's Pacific female specimens measured 0.71 mm. The Ifaluk specimens are exceedingly small, probably as a result of considerable contraction during fixation.

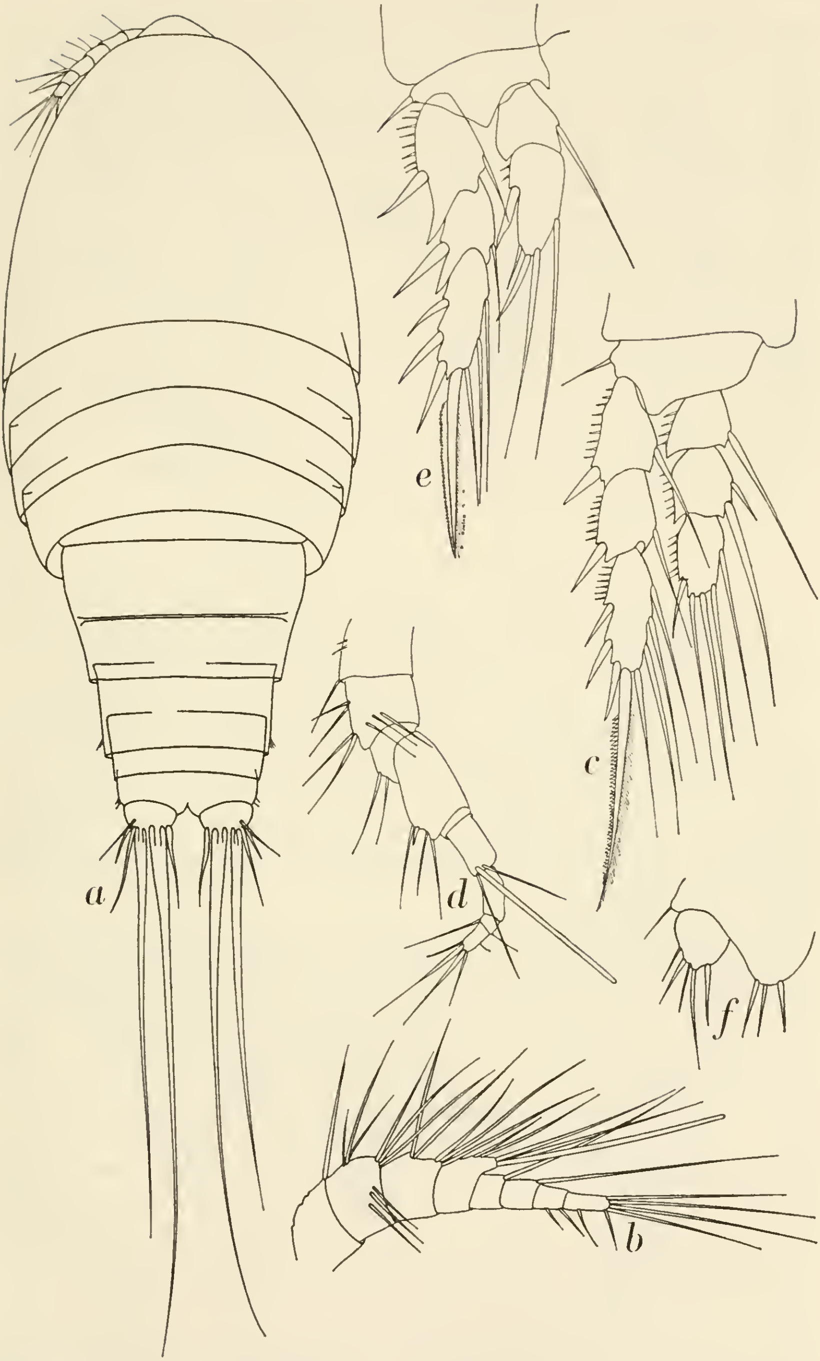

Figure 54.—*Dactylopusia tisboides* (Claus), loc. 425, ad. ♀: *a*, whole animal, dorsal view; loc. 590, ad. ♀: *b*, antennule; *c*, leg 4; loc. 425, ad. ♂: *d*, antennule; *e*, leg 2; *f*, leg 5. (*a*, × 275; *b–f*, × 460.)

The distribution of this species is world-wide, including the Indian, Pacific, and Atlantic Oceans as well as the Arctic and Antarctic regions. To the localities mentioned in Lang's paper the following areas must be added: The Puget Sound beaches in the United States (Wieser, 1959); Oresund Strait between Denmark and Sweden (Dahl, 1948); Whitstable in Kent, England (Maghraby and Perkins, 1956); the Plymouth area of England (Marine Biological Association, 1931, 1957); the Dalkey area of Dublin County in Ireland (Roe, 1958); Lough Ine of County Cork in Ireland (Roe, 1960); Teneriffe in the Canary Islands (Noodt, 1955a); in Posidonia pastures near Portofino, Italy (Gallingani, 1952); Rovinj, Yugoslavia, on the Adriatic (Vàtova, 1928); Hurghada, Egypt, on the Red Sea (Nicholls, 1944a); Port Denison in Western Australia (Nicholls, 1945); and in weed washings from Nancowry Harbour in the Nicobar Islands (Sewells, 1940).

In the Ifaluk collection the species occurs both in washings of algae (locs. 425, 431) and in sand samples (loc. 590).

Genus *Eudactylopus* A. Scott, 1909

For the present I have left the genus *Neodactylopus* Nicholls, 1945, separate from *Eudactylopus* though the differences are small. The principle difference is the long endopodite of leg 1 (longer than the exopodite) in *Eudactylopus* and the short endopodite (shorter than the exopodite) in *Neodactylopus*. There may be additional differences in the structure of maxillule and maxilla, but a clear appreciation of these would involve a reexamination of representatives in both genera; Nicholls' genus is based on a single female specimen. In addition to the type of the genus, *Neodactylopus cyclopoides* Nicholls, 1945, Sewell's *Eudactylopus anomala* (Sewell, 1940, p. 219, fig. 40) probably belongs to *Neodactylopus*.

The type of the genus *Eudactylopus* is *Dactylopus latipes* T. Scott, 1894. T. Scott's trivial name, however, is a primary homonym of *Dactylopus latipes* Boeck, 1864, p. 46 (=*Paradactylopodella latipes* (Boeck, 1864)); the name, consequently, must be dropped. I have suggested below that it be replaced by *Eudactylopus andrewei* Sewell, 1940. A description of Ifaluk specimens of this species will also be given below. Lang (1948, p. 599) has slightly extended A. Scott's original diagnosis of the genus *Eudactylopus* which now includes species with 7- to 9-segmented antennules and 1- or 2-segmented antennal exopodite. The number of species recently has increased considerably and, in an effort to review the various species and to construct a key for their identification, I have been baffled by the lack of adequate information about several species in spite of lengthy descriptions published—e.g., by Sewell. It appears that Sewell, who has contributed to the number of species, attached great importance to

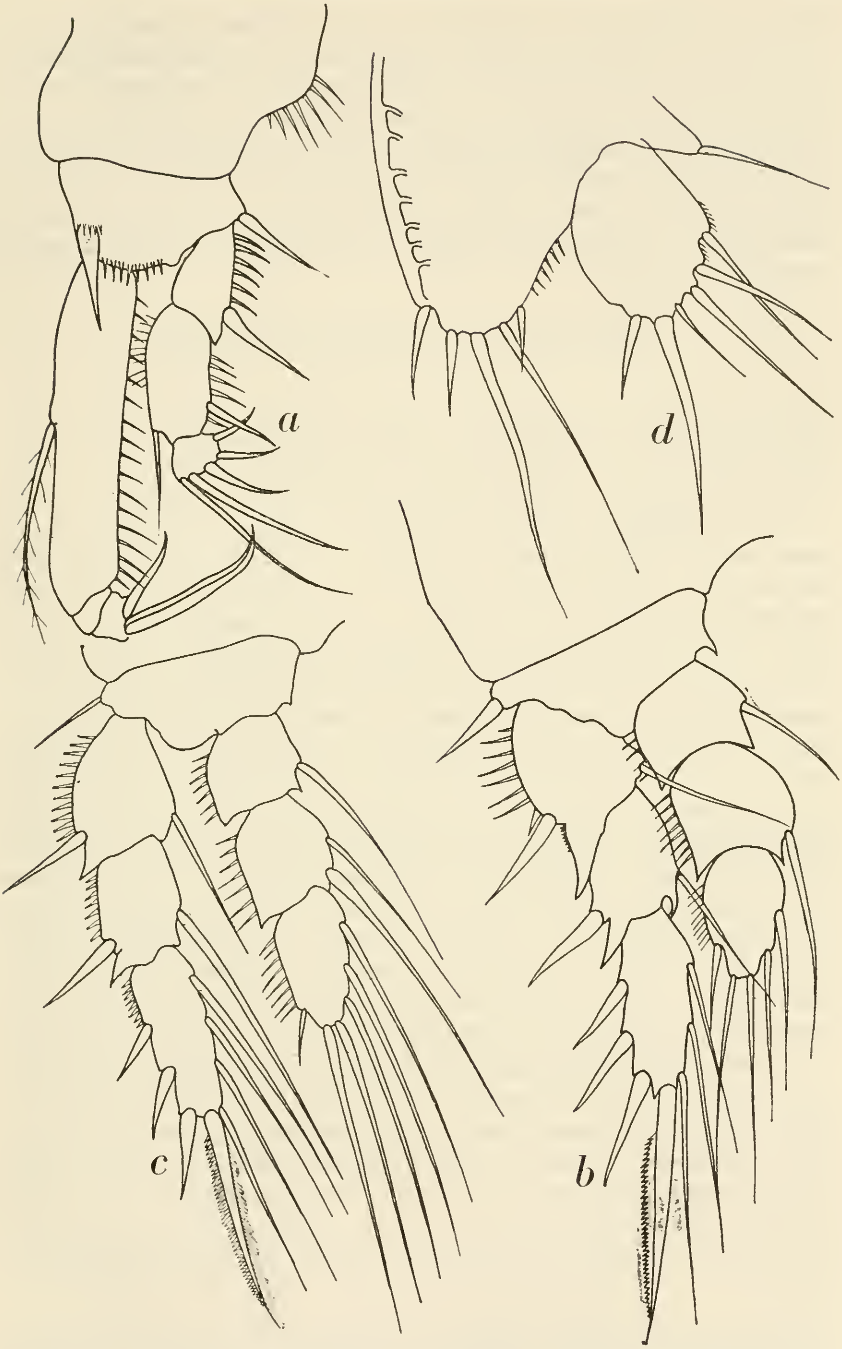

FIGURE 55.—*Dactylopusia tisboides* (Claus), loc. 590, ad. ♀: *a*, leg 1; *b*, leg 2; *c*, leg 3; *d*, leg 5. (× 625.)

the color pattern of the specimens, a characteristic which is next to worthless in alcohol-preserved specimens. Several specimens are known only in one sex or at an immature stage; descriptions by other authors arouse the suspicion that their material consisted of several species (e.g., *E. australis* Nicholls). I refrain therefore from giving a key—almost an impossibility for the males, for which the structure of leg 2 is of fundamental value—but the synonymy (as far as it can be unraveled) of all species is given. *Eudactylopus anomala* Sewell is excluded (see above).

Eudactylopus andrewi andrewi **Sewell, 1940**

FIGURES 56–59

Dactylophusia latipes Thompson and A. Scott, 1903, pp. 238, 268.
Eudactylopus latipes A. Scott, 1909, p. 219, pl. 63 (figs. 8–14).
Eudactylopus latipes.—Lang, 1948, p. 561, fig. 227 (no. 2) (in part).
Eudactylopus latipes f. *andrewi* Sewell, 1940, p. 201, figs. 31–33.

I have pointed out above that it is necessary to substitute a new name for *Dactylopus latipes* T. Scott, 1894. The name available for this species is *Eudactylopus latipes* f. *andrewi* Sewell, 1940; the name *andrewi* for Sewell's form must be raised to specific level. Sewell (loc. cit.), in his discussion of *E. latipes*, has divided this species into two forms, f. *typica* and f. *andrewi*, of which *typica* conforms to T. Scott's original description and is characterized by 9-segmented antennules; f. *andrewi* has 7-segmented antennules. As an explanation of the difference in antennular structure between the Atlantic (f. *typica*) and Indo-Pacific (f. *andrewi*) representatives of this species, Sewell suggests a different mode of development, with the result that "in the form that occurs in the Indo-Pacific region the attainment of sexual maturity in both sexes is accompanied by retention of certain immature characters." The only point in favor of this suggestion which I can take from Sewell's account is the fact that in the Vth copepodite stage the antennule is 7-segmented. A more reasonable explanation, at least for the time being, seems to me that both forms are subspecifically or probably even specifically different and I have expressed this supposition in their names. The Indo-Pacific form, which now should become the nominate subspecies, should be referred to as *Eudactylopus andrewi andrewi* Sewell, 1940; the Atlantic form, as *Eudactylopus andrewi atlanticus*, new subspecies. The Indo-Pacific form, material of which occurs in the Ifaluk collection, will be described below; no material of the Atlantic form is available at present.

MATERIAL.—Loc. 431, 1 ad. ♀, 1.05 mm.; 1 ad. ♂, 0.83 mm.

DESCRIPTION.—The following is based on the above-mentioned specimens; both have been dissected and the appendages mounted.

Adult female, total length 1.05 mm.; greatest diameter 0.26 mm.; length of longest furcal seta 0.45 mm. The body of this specimen was strongly curved and it could not be figured dorsally.

Body strongly built, with robust cephalothorax, distinctly set off from abdomen. Greatest diameter of cephalothorax in oral region, rounded anteriorly and slightly narrowing posteriorly. Head and 1st thoracic somite completely fused to form cephalic somite, which is longer than combined lengths of thoracic somites 2 to 4. Line of back, laterally, smoothly curving into well-developed rostrum, very prominent structure of cephalic region (fig. 56*a*). Rostrum large, acutely triangular with rounded apex, curved, pointing forward and slightly downward, as long as first three antennular segments, separated from cephalic somite by shallow groove. Lateral parts of cephalic somite, specially in anterolateral parts, produced to cover basal parts of oral appendages. Integument of back thickened in middorsal line directly behind rostrum, forming internal trabecle opposite oral aperture, apparently to provide ample surface for attachment of oral muscles. Epimeral plates of thoracic somites 2 to 4 moderately developed, cut off squarely.

5th thoracic somite well developed, distinctly visible in lateral and dorsal aspect. Length of abdomen equal to that of cephalothorax. Genital somite (fig. 57*b*) composed of fused abdominal somites 1 and 2, line of fusion very distinct dorsally and laterally, marked by row of spinules. Abdominal somites 3 and 4 of equal length, anal (5th) somite small, anal flap distinct, broadly rounded.

All abdominal somites have spinules, distributed as follows:

1st somite: row of spinules on each side, running obliquely upward and forward; row along line of fusion, interrupted ventrally.

2nd somite: 2 parallel, oblique rows of spinules on sides; closed row of spinules along distal end.

3rd somite: spinulation as 2nd.

4th somite: oblique row of spinules on each side and closed row along distal edge.

5th (anal) somite: row along insertion of furcal rami.

Furcal rami slightly shorter than diameter at base (proportion 13:17), slightly diverging. Internal margin nude, external margin haired. 5 marginal setae and 1 appendicular seta on each ramus. Setae 1, 5, and appendicular seta of moderate length, 1st with stiff hairs along external margin. Seta 4 small, spiniform. Setae 2 and 3 greatly lengthened and thickened, especially 2nd, reaching half the body length. Both 2nd and 3rd setae finely haired.

Antennules (fig. 58*a*) short, half length of cephalothorax, 7-segmented, 7th segment resulting from fusion of several small segments. 4th segment with well-developed conical process obscuring 5th segment;

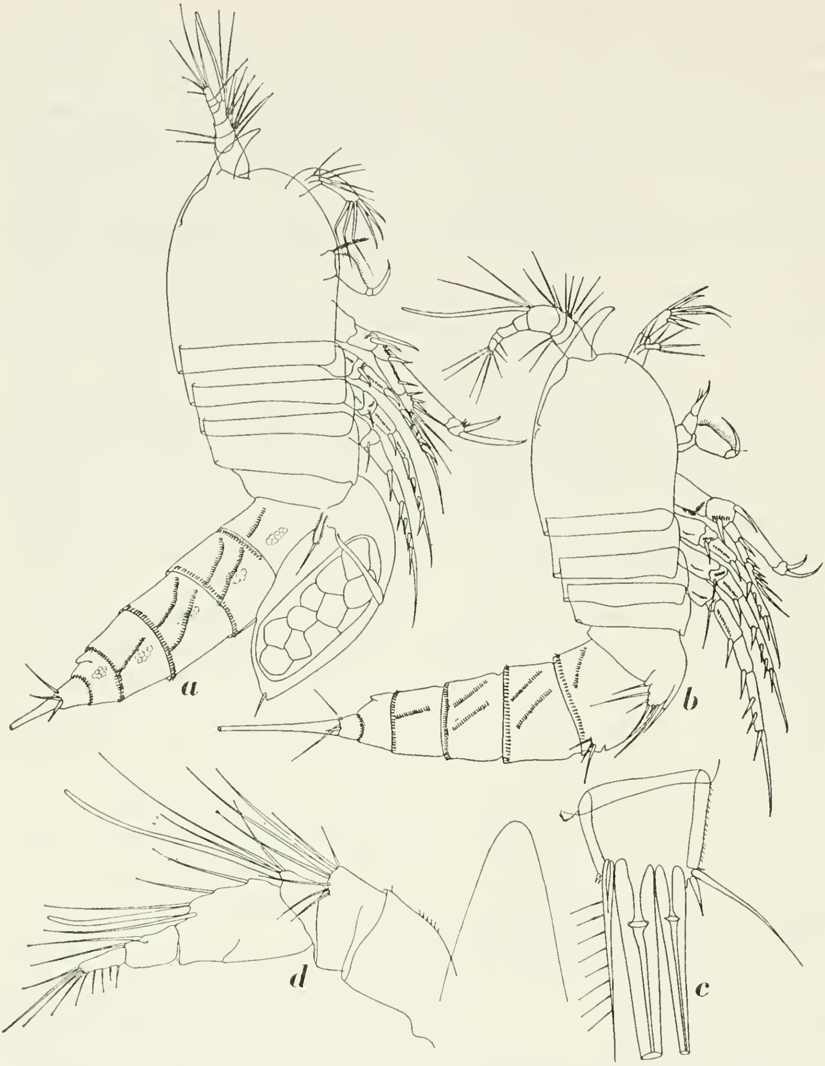

Figure 56.—*Eudactylopus andrewi andrewi* Sewell, loc. 431, ad. ♀: *a*, lateral view from right side; ad. ♂: *b*, lateral view from right side; *c*, left furcal ramus with setae, ventral view; *d*, rostrum and left antennule, dorsal view. (*a*, × 40; *b*, × 85; *c*, *d*, × 275.)

4th carries aesthetasc and 2 setae; row of spinules on segment 1.

Antenna (fig. 58*b*) with 2-segmented exopodite, jointing not particularly distinct. 2 setae are present on segment 1; 3 on 2nd exopodal segment. 1 setae at internal margin of allobasis.

Mandible (fig. 58*c*) with slender, finger-shaped palp. Cutting edge of praecoxa with 5 blade-shaped, rounded teeth and haired

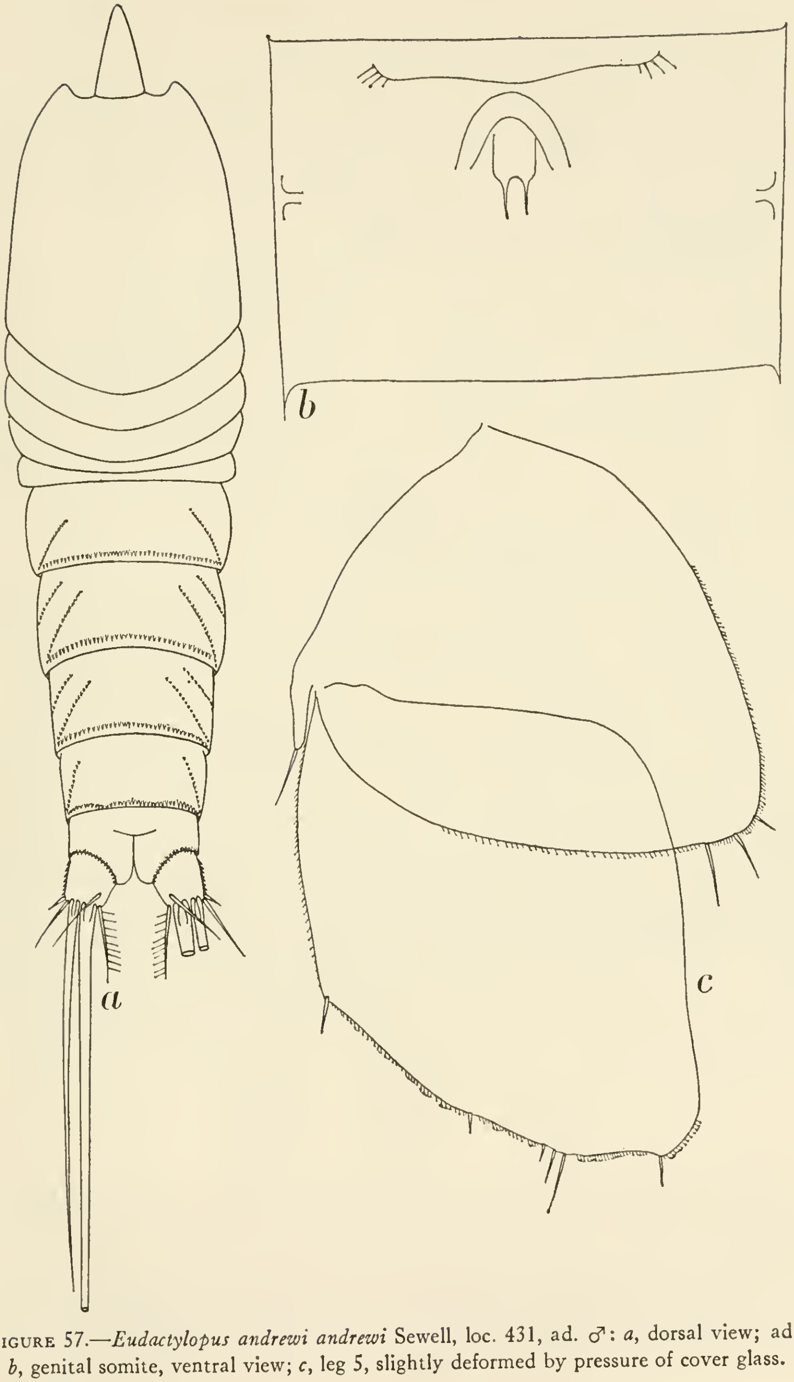

FIGURE 57.—*Eudactylopus andrewi andrewi* Sewell, loc. 431, ad. ♂: *a*, dorsal view; ad. ♀: *b*, genital somite, ventral view; *c*, leg 5, slightly deformed by pressure of cover glass. (*a*, × 145; *b*, *c*, × 275.)

basal seta. Basipodite short, cylindrical, with 2 setae. Endopodite unsegmented, with 6 setae, exopodite absent.

Maxillule (fig. 58*d*) with strongly developed arthrite, obscuring structure of rest of maxillule. There is apparently a well-developed coxal endite, bearing 3 strong setae; a small basal endite, bearing 3 short setae; a small, unsegmented endopodite with 6 setae; and a small exopodite with 2 strong setae. No trace of epipodite; teeth of arthrite strong and curiously shaped.

Maxilla (fig. 58*e*) with scarcely indicated praecoxal endite, bearing 2 setae. Coxa with 2 endites (the more proximal may belong to praecoxa as no sharp line divides praecoxa and coxa); proximal endite with 2 setae; distal (larger) endite with 2 short spines and a seta. Basal endite well developed, contiguous with strong, curved spine. A much smaller spine occurs at the fusion of spine and endite, where a small endopodite also inserts, carrying 3 thin setae and 1 slightly larger seta. The figure given here actually represents the male maxilla because in my preparation of the female maxilla, the latter was in an unfavorable position.

Maxillipede (fig. 58*f*) chelate, coxa with 2 apical setae, basis slightly swollen, spinulose along internal margin, at middle of that margin with fine seta. Endopodite shaped as curved digit, composed of 2 fused segments, slightly shorter than basis. 2 additional setae occur on the endopodite near the place of fusion of both segments.

Leg 1 (fig. 59*a*) with 3-segmented exopodite and 2-segmented endopodite. Basis well developed, with strong spine at external and internal borders; that at internal border placed on a conspicuous socle. 2nd exopodal segment 3 times as long as wide, with fine internal seta. 3rd exopodal segment small, with total of 4 appendages. 1st endopodal segment styliform, longer than whole exopodite, with internal seta slightly above middle of internal margin. 2nd endopodal segment small, bearing 2 curved, sabre-shaped claws of very unequal size.

The particulars of legs 2 to 4 appear from figures 59*b–d*; the setal formula is:

	endopodite	*exopodite*
leg 2	1.2.221	1.1.223
leg 3	1.1.321	1.1.323
leg 4	1.1.221	1.1.323

On some of the endopodal segments there is a curious pattern of polygonal fields, apparently representing muscular insertions or glands.

5th feet big, foliaceous, forming, with ventral part of genital somite, a marsupium containing a ball of eggs. The exopodite of leg 5 reaches as far backward as halfway along the 3rd abdominal somite.

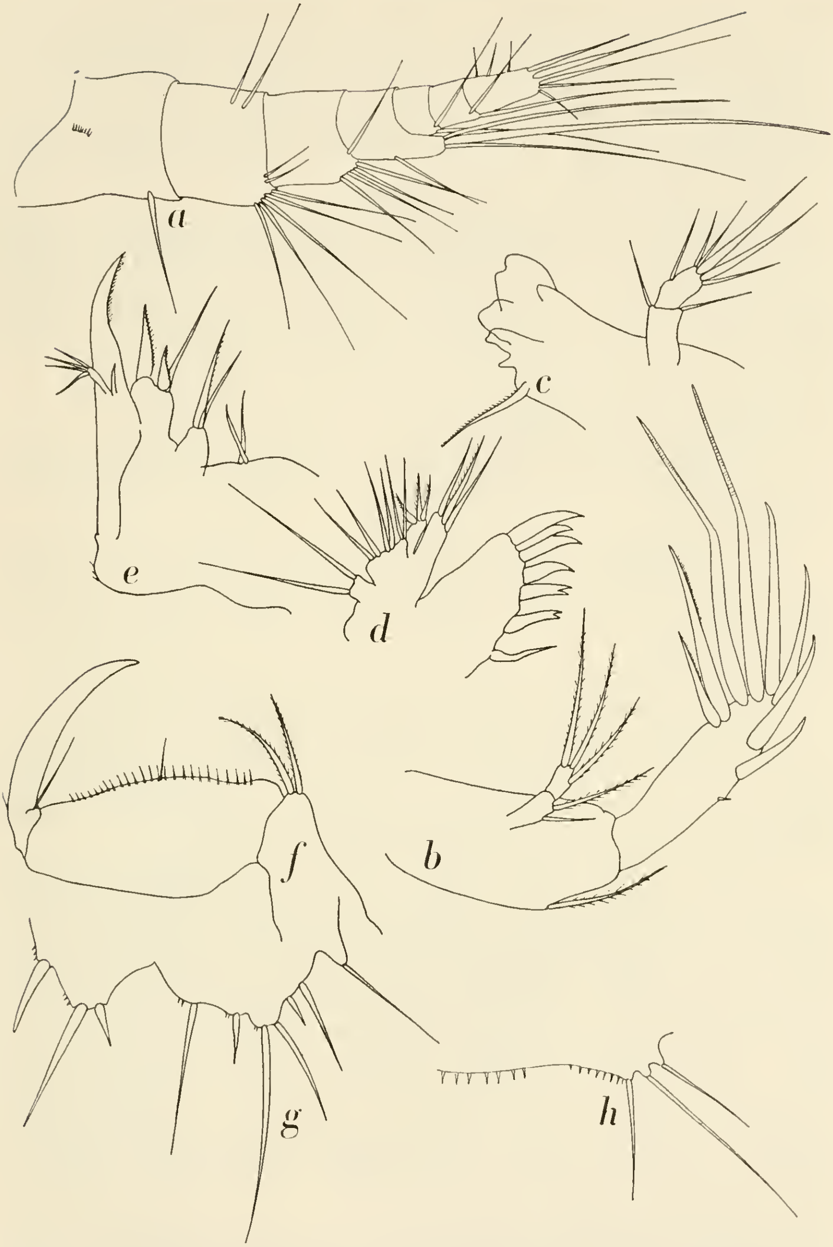

Figure 58.—*Eudactylopus andrewi andrewi* Sewell, loc. 431, ad. ♀: *a*, antennule; *b*, antenna; *c*, mandible; *d*, maxillule; *f*, maxillipede; ad. ♂: *e*, maxilla; *g*, leg 5; *h*, leg 6. (*a–f*, *h*, × 460; *g*, × 275.)

The shape of leg 5 can best be appreciated from figure 57*c;* there are 3 setae on the baso-endopodite, a fine seta on the external lobe and 6 setae dispersed along the free border of the exopodite. It must be borne in mind that the 5th legs are strongly concave structures surrounding the eggs. These eggs are small; at least 50 are present in the pouch.

Color of preserved animal greenish, no eye visible. The whole integument is covered by short hairs, slightly increasing in length on the 5th legs, with the result that these appear as definitely hirsute. On the sides of the abdominal somites there are polygonal fields representing muscular insertions or glands. Genital flap a broad plate, on each side with 4 minute hairs.

Adult male, total length 0.83 mm.; greatest diameter 0.21 mm.; length of longest furcal seta 0.56 mm.

General shape of body as in female, with the result that complete description is superfluous (figs. 56*b*, 57*a*). Principal points of difference are:

1. Length of male inferior to that of female; proportion of cephalothorax and abdomen is 6:5. Abdominal somites 1 and 2 separate. Thickened part of cephalic somite behind rostrum better developed than in female.

2. Ornamentation of the body as in female; genital flaps (leg 6) with 3 strong setae, very conspicuous in lateral aspect.

3. Antennules of male 6-segmented, but segment 4 composed of 2 fused segments with distinct line of fusion. There is an aesthetasc on segment 3 and one on segment 4. Setation represented in figure 56*d*; some of smaller setae may have been overlooked.

4. No differences occur in structure of antenna, oral parts, and legs 1, 3, and 4. Endopodite of leg 2 modified, 2-segmented (fig. 59*e*). Segment 1 normally developed, with 1 internal seta. 2nd endopodal segment only slightly longer than 1st, with 4 setae at the internal margin, increasing in size distally. At apical portion of segment there are 3 spines; internal spine with broad base, rapidly tapering into fine point. Median spine strongly chitinized, curved. External spine strong and straight, reaching slightly beyond end of exopodite, apex pointed, not bifid. 5th legs completely different from those of female (fig. 58*g*). Baso-endopodite and exopodite of same length, fused. 3 spines at baso-endopodite and 6 at exopodite. Shape and position can best be judged from figure 58*g*.

Remarks.—The present specimens are in complete conformity with A. Scott's and Sewell's descriptions except for the fact that the polygonal fields on the abdominal somites and the legs of the female are not mentioned by these authors. In Sewell's male specimen the apex of the median endopodal spine of leg 2 is bifid.

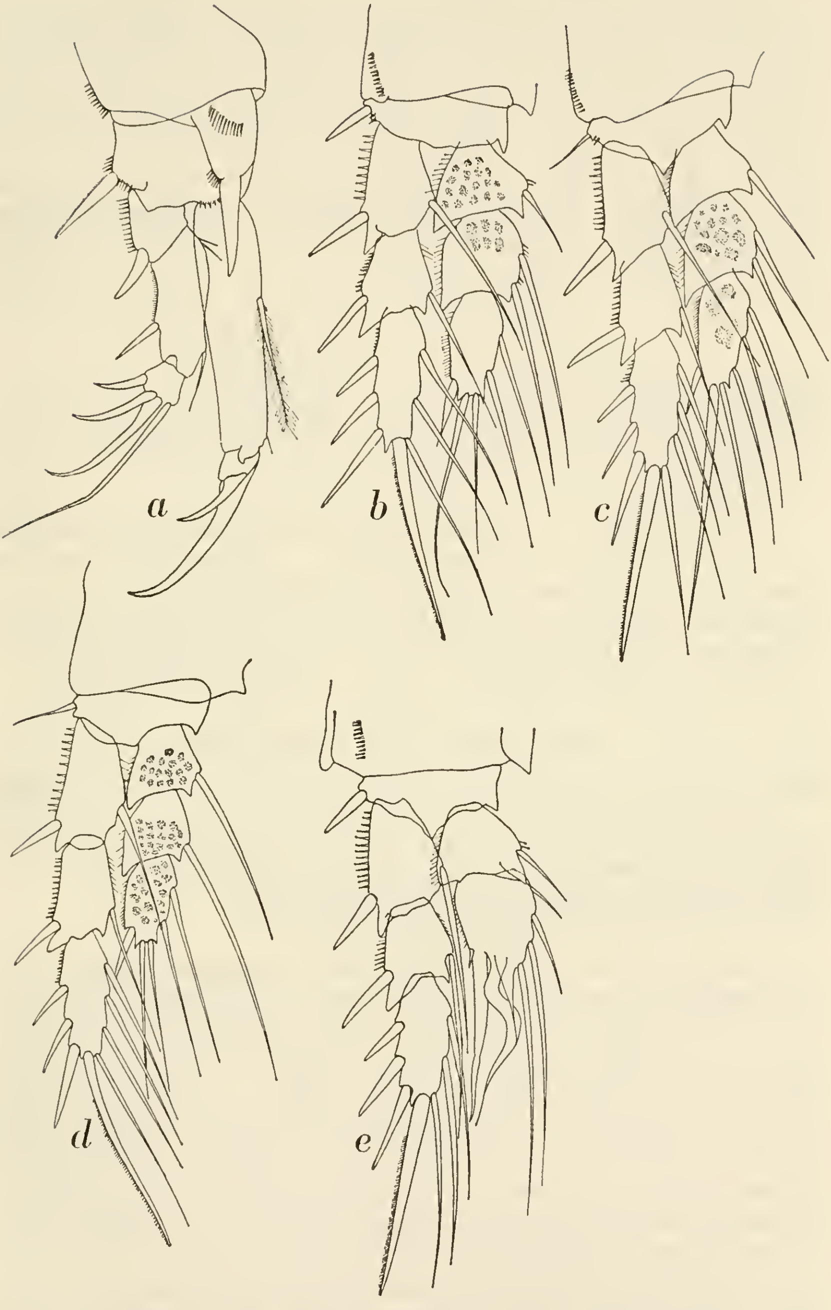

Figure 59.—*Eudactylopus andrewi andrewi* Sewell, loc. 431, ad. ♀: *a*, leg 1; *b*, leg 2; *c*, leg 3; *d*, leg 4; ad. ♂: *e*, leg 2. (× 275.)

Eudactylopus andrewi andrewi was recorded previously in washings of dredged debris from the pearl oyster banks in the Gulf of Mannar off Ceylon (Thompson and A. Scott, 1903); in washings of dredged invertebrates from 13 m. depth off Pulu Jedan in the Aru Islands of the Malay Archipelago (A. Scott, 1909: 2 ♀♀, 1.4 mm. length); in weed washings from Nancowry Harbour in the Nicobar Islands and from Addu Atoll in the Maldive Archipelago (Sewell, 1940: ad. ♀, 1.28 mm.; ad. ♂, 0.91 mm.; ♀ cop. stage V, 1.04 mm.). The present specimens were obtained from washings of *Caulerpa* off the reef ridge at the north end of Falarik in the Ifaluk Atoll.

Eudactylopus andrewi atlanticus, new subspecies

Dactylopus latipes T. Scott, 1894, p. 99, pl. 10 (figs. 38–43).
Eudactylopus latipes.—Lang, 1936, p. 39.—Carvalho, 1952, p. 158, pl. 2 (figs. 63–67).
Eudactylopus latipes.—Lang, 1948, p. 561, fig. 227 (no. 2) (in part).
Eudactylopus latipes f. *typica* Sewell, 1940, p. 201.—Noodt 19,55, p. 59, pl. 2 (figs. 6–12).

This subspecies was originally described by T. Scott from Accra on the Gulf of Guinea in a shore gathering. The female, the only sex described by Scott, measured 1.25 mm. Additional female specimens, length 1.5 mm., were recorded by Carvalho (1952) from the bay at Santos on the Atlantic coast of Brazil. Males and females have been recorded by Noodt (1955) from the Sea of Marmara off Turkey.

Eudactylopus robustus (Claus, 1863)

Thalestris robusta Claus, 1863, p. 129, pls. 18 (figs. 17–23), 19 (fig. 1); 1866, p. 34.—Gourret, 1889, p. 474; 1890, p. 325.
Plesiothalestris opima Brian, 1928, pp. 2, 36, figs. 1–12; 1928a, pp. 298, 315, fig. 16.
Eudactylopus robustus.—Lang, 1936, p. 36; 1948, p. 560, fig. 227 (no. 1).
Eudactylopus opima f. *major* Sewell, 1940, p. 207, fig. 34.
Eudactylopus opima f. *minor* Sewell, 1940, p. 209, fig. 35.

For a description of this species I refer to Lang and Sewell. Sewell has divided the species into a large form, f. *major*, ♀♀ 1.65–1.76 mm., ♂ 1.162 mm., and a small form, f. *minor*, ♀ 0.899 mm., ♂ 0.866 mm. The structural differences which can be derived from Sewell's descriptions are exceedingly small and, in my opinion, on the level of normal individual variability. I see no reason, therefore, to separate both forms and I have sunk them into the synonymy of the nominal species. This is justified even more by the fact that the differences in length are not proportionally larger in this species then in many other species of Harpacticoids.

The species is well distributed through the Mediterranean: from the bay of Marseilles, France (Gourret, 1889, 1890); from Nice, France (Claus, 1863, 1866); from Messina, Sicily (Claus, 1863); from Syme

Island and its port in the Aegean Sea (Brian, 1928, 1928a). For the Indo-Pacific area, it is known from the following localities: Nancowry Harbour and the east coast of Camorta Island in the Nicobar Islands, and Addu Atoll in the Maldive Archipelago (Sewell, 1940). It was found in all these localities in weed washings.

Eudactylopus spectabilis (Brian, 1923)

Parathalestris clausi var. *spectabilis* Brian, 1923, pp. 129, 133, pl. 4.—Vàtova, 1928, p. 181.
Parathalastris spectabilis.—Brian, 1928, pp. 4, 36; 1928a, pp. 298, 317.
Eudactylopus spectabilis.—Monard, 1928, p. 356, fig. 21 (no. 2).—Lang, 1936, p. 36; 1948, p. 561, fig. 228.—Krishnaswamy, 1950, p. 119.

This species, of which the females measure 1–1.1 mm. and the males 0.95–1 mm., is restricted to the Mediterranean, where it has been recorded from Banyuls-sur-Mer, France (Monard, 1928); from the Rovinj, Yugoslavia, area in the Adriatic (Brian, 1923); from the islands of Rhodes, Astypalaia, Karpathos, and the port of Syme in the Aegean Sea (Brian, 1928, 1928a).

Eudactylopus striatus Sewell, 1940

Eudactylopus striatus Sewell, 1940, pp. 211, 357, figs. 36, 37.—Krishnaswamy, 1950, pp. 117, 119.

This species is known from only the adult male (length 1.014 mm.) and the Vth copepodite stage of the female (length 1.055 mm.). It can be recognized by the curious color pattern and characters of the 2nd leg. All specimens originate from weed washings from Nancowry Harbour in the Nicobar Islands.

Eudactylopus fasciatus Sewell, 1940

FIGURES 60, 61

Eudactylopus fasciatus Sewell, 1940, p. 215, 357, figs. 38, 39.—Krishnaswamy, 1950, pp. 117, 119.

MATERIAL.—Loc. 81–A–3–d, ♂ cop. stage V, 1.05 mm.

DESCRIPTION.—The following is based on the above-mentioned specimen, which has been dissected and mounted.

Male copepodite stage V, total length 1.05 mm.; greatest diameter 0.32 mm.; longest furcal seta 0.60 mm.

Body moderately robust in dorsal aspect, cephalothorax and abdomen separated by constriction (fig. 60*a*). Head and 1st thoracic somite fused, greatest diameter of body at end of this cephalic somite, broadly rounded anteriorly, gradually tapering posteriorly. Length of cephalic somite equal to combined lengths of thoracic somites 2 to 4; back, in lateral aspect, evenly rounded into rostrum (fig. 60*b*).

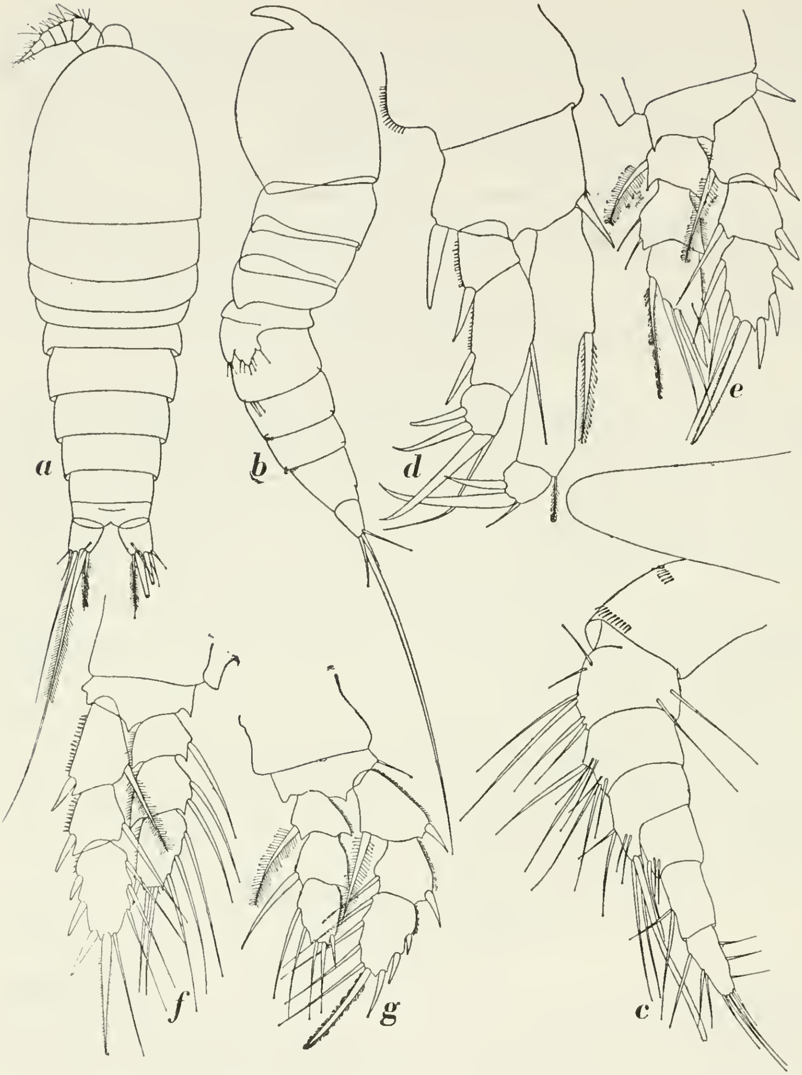

FIGURE 60.—*Eudactylopus fasciatus* Sewell, loc. 81–A–3–d, ♂ cop. st. V: *a*, whole animal, dorsal view; *b*, same animal, lateral view from left side; *c*, rostrum and left antennule, dorsal view; *d*, leg 1; *e*, leg 2; *f*, leg 3; *g*, leg 4. (*a*, *b*, × 62; *c*, *d*, × 275; *e*–*g*, × 165.)

Rostrum well developed, curved triangular plate with rounded apex, separated from cephalic somite by groove, pointing obliquely downward and forward. Basal part of rostrum visible in dorsal aspect. Lateral parts of cephalic somite produced to cover basal parts of oral appendages; epimeral plates of 2nd to 4th thoracic somites well developed, broadly rounded, very slightly backwardly produced. 5th thoracic somite small but distinctly visible.

Abdomen 4-segmented by fusion of somites 4 and 5; future division of this somite already indicated. Abdominal somites 1 and 2 of equal length, 3rd slightly shorter, 4th + 5th 1½ times length of 3rd. Genital flaps already indicated at distal end of 1st abdominal somite by 3 setae on each side (fig. 61*g*). Spinules occur on ventrolateral surfaces of 2nd and 3rd abdominal somite. Furcal rami divergent, 1¼ times as long as wide, setation as in *E. andrewi andrewi.* Abdominal somites and furca completely covered with small, prickly hairs, particularly visible on lateral walls.

Antennule 7-segmented, setation represented in figure 60*c*. Segment 1 with 2 rows of spinules; 4th segment with moderately long conical process, bearing aesthetasc and 2 setae.

Antenna (fig. 61*a*) with 1-segmented exopodite, bearing 5 setae: 2 on basal part (only 1 in Sewell's description of this stage) and 3 at apical part. No indication of future division of appendage. Endopodite with spinules along internal margin, gradually increasing in size distally.

Cutting edge of mandibular praecoxa with 5 moderately developed teeth and basal seta. Palp with well-developed endopodite, bearing 5 setae, and small exopodite with 2 setae. There are, in addition, two setae on the basipodite (fig. 61*b*).

Arthrite of maxillular praecoxa well developed. 5 weak, spinelike teeth and apical seta and basal seta. Coxal endite present but small, usually covered completely by better-developed basal endite, carrying 2 setae. This coxal endite is not mentioned in the descriptions of any species of this genus, yet it is distinctly present on both sides in my specimen. Basal endite broad, with 4 setae. 2 setae on basipodite; exopodite and endopodite small, with 2 and 4 setae respectively. No trace of an epipodite (fig. 61*c*).

Maxilla with 4 endites: 2 praecoxal, each with 2 setae, long coxal endite with 3 short setae, and notably strong basal endite. The latter bears a particularly strong, short spine, contiguous with the endite, and 2 fine flanking setae. A spinulose seta at base of endite represents the rudiment of the endopodite (fig. 61*d*).

Maxillipede chelate, coxa with 2 subapical setae. Basis with straight, spinulose internal border; external border moderately swollen. Endopodite composed of 2 segments, forming a slightly curved, pointed digit. A small seta occurs at the line of fusion of both segments (fig. 61*e*).

Leg 1 (fig. 60*d*) with strongly developed coxa and basis. Coxa with external spinulose swelling, basis with strong internal and external spines. Exopodite 3-segmented, endopodite 2-segmented. 2nd exopodal segment twice as long as 1st, with internal seta. 3rd exopodal segment small, with total of 4 appendages. 1st endopodal segment

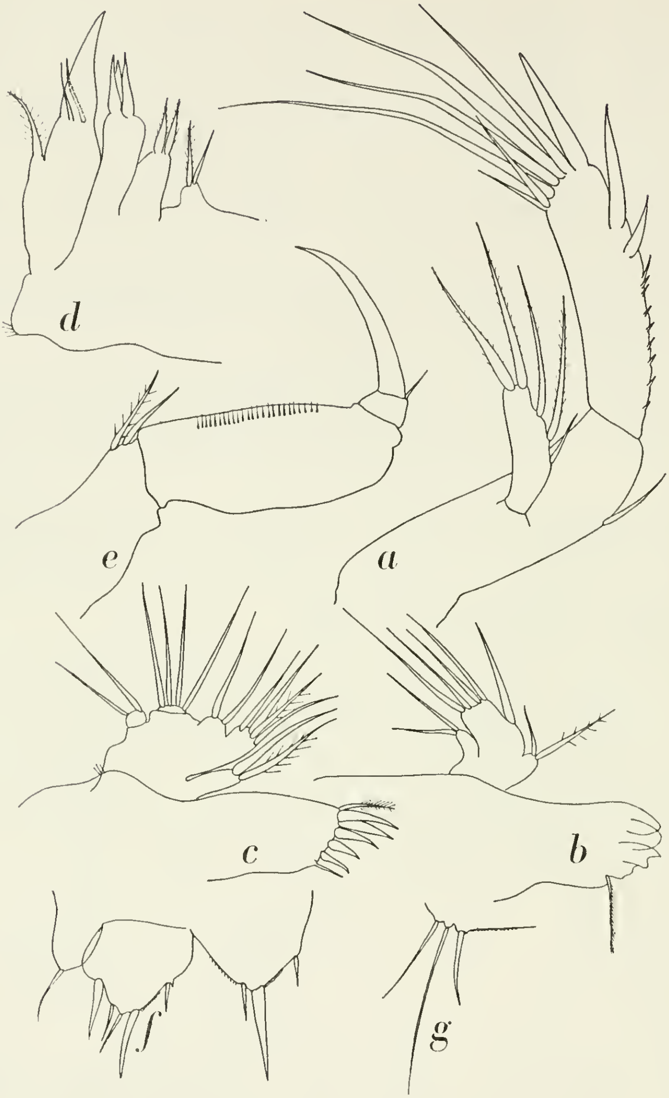

FIGURE 61.—*Eudactylopus fasciatus* Sewell, loc. 81–A–3–d, ♂ cop. st. V: *a*, antenna; *b*, mandible; *c*, maxillule; *d*, maxilla; *e*, maxillipede; *f*, leg 5; *g*, leg 6. (*a–e*, × 460 ; *f*, *g*, × 275.)

elongate, slightly longer than whole exopodite, with seta halfway along internal margin and apical seta. 2nd endopodal segment small, with 2 unequal, curved claws and fine seta.

The particulars of legs 2 to 4 appear from figures 60*e–g*, the setal formula, and the following notes. Setal formula:

	endopodite	*exopodite*
leg 2	1. 2. 122 (modified)	1. 1. 223
leg 3	1. 2. 321	1. 1. 323
leg 4	1. 1. 221	1. 1. 323

Endopodite of leg 2 modified; jointing between endopodal segments 2 and 3 distinctly developed. Segment 1 with normal internal seta; segment 2 with 2 fine internal setae, segment 3 with 3 internal setae and 2 flattened, almost straight, spines at the apex (fig. 60*e*).

Jointing between exopodite and baso-endopodite of leg 5 weakly indicated; external lobe big, with a fine seta. There are 5 setae on the exopodite and 3 at the baso-endopodite; the position and shape can best be judged from figure 61*f*.

Color (according to field notes) cream with dark-dotted, longitudinal bands, completely faded in alcohol.

Remarks.—This species, the male at least, is exceedingly close to *Eudactylopus striatus* Sewell and differs principally in the color pattern. Lengths of the sexes, as given by Sewell, are: 1.165 for the adult female, 0.74 for the adult male, and 1.15 for the male Vth copepodite stage. The identification of the Ifaluk specimen is mainly on the strength of the color pattern and the general agreement with Sewell's description of this stage. In the absence of notes on the color, I do not see how it can be distinguished from the corresponding stage of *Eudactylopus latipes*, which might also occur in the collection.

E. fasciatus previously has been recorded from Nancowry Harbour in the Nicobar Islands and Addu Atoll in the Maldive Archipelago, at both localities between algae. The present specimen was washed from the alga *Lyngbya* from the lagoon shelf at Falarik in the Ifaluk Atoll, at a depth of about 6 feet.

Eudactylopus australis Nicholls, 1941

Eudactylopus australis Nicholls, 1941, p. 410, fig. 15; 1942a, p. 135, fig. 1.—Krishnaswamy, 1950, p. 119.

This species has the general appearance of *E. spectabilis* (Brian); it is, however, characterized by a 2-segmented exopodite of the antenna. The original records are from Sellick Beach and Spencer Gulf in South Australia, where females, 1.26 to 1.38 mm. length, were found in dredgings and weed washings. Additional female and male specimens were recorded by Nicholls (1942a) from South and Western Australia, particularly Rottnest Island; these specimens show small structural differences with those previously recorded. The female, moreover, is much larger (1.68 mm.); the males measured 1.35 mm. and, in the structure of leg 2, approach *E. fasciatus* and *E. striatus* very closely. Nicholls' material may have been composite.

Eudactylopus krusadensis Krishnaswamy, 1950

Eudactylopus krusadensis Krishnaswamy, 1950, pp. 118-121, figs. 1-2; 1953, p. 69.

This species is based on three males collected in Kundugal Channel (type locality) off Krusadi Island in the Gulf of Mannar in a night plankton haul. The specimens measured 0.739 mm. and are characterized mainly by their striking color pattern. Krishnaswamy's description is very incomplete and the drawings downright bad, especially his drawing of leg 2. The 2nd exopodal segment of leg 1 is figured (and described) with 2 internal setae, which is almost certainly faulty. The (few) principal points from Krishnaswamy's description are recapitulated in his 1953 paper. Unless additional information, especially good drawings of the legs and oral parts, become available, the species must stand as an uncertain species.

Genus *Idomene* Philippi, 1843

I have, for the purpose of stability, accepted Lang's definition of this genus, which now also includes the genera *Xouthous* Thomson, 1822, *Idomenella* T. Scott, 1906, and *Megarthrum* Norman and T. Scott, 1906; type species is *Idomene forficata* Philippi, 1843.

The following species are now known:

FEMALES	MALES
I. forficata Philippi, 1843	*I. forficata* Philippi, 1843
Xouthous novae-zealandiae Thomson, 1882	*X. novae-zealandiae* Thomson, 1882
Dactylopus coronatus T. Scott, 1894	
D. pectinatus T. and A. Scott, 1898	
D. antarcticus Giesbrecht, 1902	*D. antarcticus* Giesbrecht, 1902
Dactylophusia laticauda Thompson and A. Scott, 1903	
D. aemula Thompson and A. Scott, 1903	
Dactylopusia purpurocincta Norman and T. Scott, 1905	
Megarthrum simulans Brady, 1910	
I. pusilla Brady, 1910	
	I. australis Brady, 1910
I. borealis G. O. Sars, 1911	
D. ferrieri T. Scott, 1912	
I. intermedia Lang, 1934	
X. maldiviae Sewell, 1940	
I. scotti Lang, 1948	(*I. scotti* Lang, 1948)

The position of the following species is uncertain:

I. kabylica Monard, 1936

The following keys have been adapted from Lang (1948, p. 565).

Key to Species of *Idomene*

FEMALES

1. Thoracic somites 2 to 4 each with 3 spinules on the epimeral plates. **I. simulans** (Brady)
   Epimeral plates of all thoracic somites free from spinules 2
2. Exopodite and baso-endopodite of leg 5 fused . . **I. coronata** (T. Scott)
   Exopodite of leg 5 free 3
3. Baso-endopodite of leg 5 with 6 setae . . . . . . **I. borealis** G. O. Sars
   Baso-endopodite of leg 5 with 5 setae 4
4. Exopodite of leg 5 with 4 setae . . . . **I. antarctica** (Giesbrecht)
   Exopodite of leg 5 with 5 or 6 setae 5
5. Exopodite of leg 5 with 6 setae . . . . **I. pectinata** (T. and A. Scott)
   Exopodite of leg 5 with 5 setae 6
6. Baso-endopodite of leg 5 reaches halfway along exopodite 7
   Baso-endopodite of leg 5 reaches end of exopodite or beyond 12
7. 1st segment of endopodite leg 1, 2 times as long as wide 8
   1st segment of endopodite leg 1, 2½ times as long as wide or longer . . . 11
8. Endopodite of leg 1 distinctly 3-segmented . . . . **I. forficata** Philippi
   Endopodite of leg 1, 2-segmented 9
9. Terminal claws of endopodite leg 1 of unequal length. **I. purpurocincta** (Norman and T. Scott)
   Terminal claws of endopodite leg 1 of equal length though of different shape 10
10. Baso-endopodite of leg 5 with 5 spiniform setae. **I. novaezealandiae** (Thomson)
    Baso-endopodite of leg 5 with 5 flat, dagger-shaped spines. **I. maldiviae** (Sewell)
11. 1st segment of endopodite leg 1 longer than whole exopodite. **I. scotti** Lang
    1st segment of endopodite leg 1 shorter than whole exopodite. **I. ferrieri** (T. Scott)
12. Antennule 6-segmented 13
    Antennule 7-segmented 14
13. Exopodite and baso-endopodite of leg 5 with short, spiniform setae. **I. laticaudata** (Thompson and A. Scott)
    Setae of leg 5 normally developed, slender . . . . **I. intermedia** Lang
14. Setae on leg 5 normally developed, long and fine . . . . **I. pusilla** Brady
    Setae of baso-endopodite of leg 5 short, compressed and dagger-shaped; those of exopodite short . . . . . **I. aemula** (Thompson and A. Scott)

MALES

1. Endopodite of leg 1, 3-segmented 2
   Endopodite of leg 1, 2-segmented . . . . **I. novaezealandiae** (Thomson)
2. Exopodite and endopodite of leg 1 of nearly the same length (exopodite may be implanted much higher than endopodite) 3
   Exopodite as long as, or shorter than, 1st endopodal segment of leg 1 . . 4
3. 1st segment of endopodite leg 1 twice as long as wide. **I. australis** Brady
   1st segment of endopodite leg 1 more than twice as long as wide. **I. antarctica** (Giesbrecht)

4. Internal seta 1st segment of endopodite leg 1 inserting halfway along margin. **I. forficata** Philippi
   Internal seta 1st segment of endopodite leg 1 inserting in proximal third of internal margin . . . . **I. scotti** Lang

Idomene purpurocincta (Norman and T. Scott, 1905)

Figures 62, 63

Dactylopusia purpurocincta Norman and T. Scott, 1905, p. 295.—Lang, 1936c, p. 30.

Megarthrum purpurocinctum.—Norman and T. Scott, 1906, p. 175, pls. 10 (fig. 17), 12 (fig. 10), 13 (fig. 10), 14 (fig. 9), 18 (fig. 6), 19 (fig. 1), 20 (figs. 4, 5).—Marine Biological Association, 1931, p. 163; 1957, p. 167.

Idomene purpurocincta.—Lang, 1936c, pp. 26, 30; 1948, p. 569, figs. 231 (no. 8), 233 (no. 2).

Xouthous purpurocinctum.—Sewell, 1940, pp. 197, 357, 371, fig. 29.

Material.—Loc. 425, 1 ad. ♀, 0.30 mm. Loc. 431, 1 ad. ♀, 0.27 mm.

Description.—The female specimen from locality 425 has been described completely and has been dissected and mounted. The external appearance of the female from locality 431 is also described; this specimen has been preserved.

Adult female (from locality 425), total length 0.30 mm.; greatest diameter 0.14 mm.; length of longest furcal seta 0.11 mm.

Body strongly built and of characteristic appearance, with broadly rounded front, gradually tapering posteriorly, compressed dorsoventrally and with short furcal setae (fig. 62*a*). Head and 1st thoracic somite completely fused to form cephalic somite, which is as long as combined lengths of thoracic somites 2 to 4. Line of back in lateral aspect smoothly curved, gently running into small rostrum (fig. 62*b*). Laterally it is scarcely produced, but the laterocaudal border is slightly drawn out. Cephalic somite in dorsal aspect anteriorly very broadly rounded, almost semicircular, caudally concave. Rostrum invisible from above, small, bluntly pointed, as long as 1st antennular segment. Greatest diameter of body at oral aperture. Thoracic somites 2 to 4 of nearly same length; epimeral plates considerably produced backward, increasing in length caudally, with the result that epimeral plate of 4th thoracic somite reaches halfway along genital somite. 5th thoracic somite small, without epimeral plates, visible both dorsally and laterally. No teeth visible on thoracic somites.

Genital somite resulting from fusion of abdominal somites 1 and 2; line of fusion visible both laterally and dorsally. Genital somite barrel-shaped in dorsal view, more than 2 times as wide as long, 1½ times as long as 3rd abdominal somite. 4th abdominal somite slightly shorter than 3rd, as long as anal somite. Spinules occur on lateroventral surfaces of genital, 3rd, and 4th somites. Anal somite with

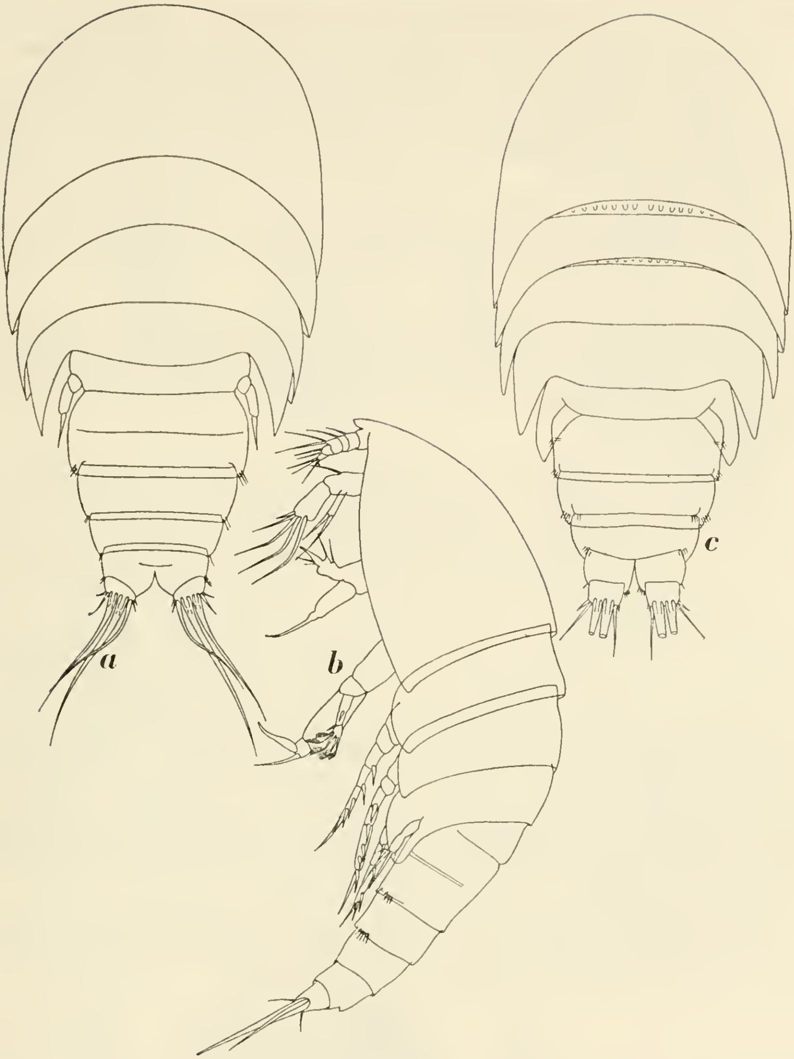

FIGURE 62.—*Idomene purpurocincta* (Norman and T. Scott), loc. 425, ad. ♀: *a*, whole animal, dorsal view; *b*, same animal, lateral view; loc. 431, ad. ♀: *c*, whole animal, dorsal view, (× 275.)

proximal, broadly rounded anal flap and some lateral spinules near insertion of furcal rami.

Rami of furca diverging, each ramus twice as broad as long, cut off obliquely, with 5 marginal setae and 1 appendicular seta. Seta 1 fairly long, only slightly shorter than 2 or 3, fine, gracefully curving outward. Seta 4, 5, and appendicular seta small. Setae 2 and 3 lengthened and thickened, curving outward, ¾ length of abdomen.

Both are swollen at base, swollen part of seta 2 of considerable length. In addition, there are some spinules at the internal furcal border.

Antennules (fig. 63*f*) very short, ¼ length of cephalic somite, 6-segmented. 4th segment with small conical process bearing aesthetasc and 2 setae. Setae nude and not plumose as in many other members of this genus.

Antenna (fig. 63*g*) with 2-segmented exopodite, slender, with 1 and 3 setae respectively. Allobasis with single seta; endopodite with total of 8 spines and setae; 4 setae are geniculate.

Except for the mandibular palp and the maxillipede, the oral appendages of this species will not be described in detail. Exopodite of mandibular palp 1-segmented, styliform. There are 6 spiniform setae, of which 2 along the external border are flattened and dagger-shaped (fig. 63*h*).

Maxillipedes chelate; coxa small, with a single spinulose seta. Basis moderately swollen, internal margin straight, spinulose, with a single median seta. Endopodite 1-segmented, digitiform, curved and pointed, distal ⅔ of internal margin finely denticulated (fig. 63*i*).

Leg 1 (fig. 63*a*) with 3-segmented exopodite and 2-segmented endopodite. Coxa and basis fairly large; basis with short internal spine and fine external seta. Exopodite ⅔ length of 1st endopodal segment, inserting proximally of endopodite, 1st segment without and 2nd segment with internal seta, slightly lengthened. Apical exopodal segment small, with total of 5 appendages. 1st endopodal segment twice as long as wide, with small internal seta inserting at upper third of margin. 2nd endopodal segment small, as long as wide, bearing 3 appendages: large, denticulated claw; seta of equal length; and very fine seta. Claw and seta stronger and longer than appears from Norman and T. Scott's figure.

The details of legs 2 to 4 appear from the setal formula, figures 63*b–d*, and the following notes. Setal formula:

	endopodite	*exopodite*
leg 2	1. 2. 221	1. 1. 223
leg 3	1. 1. 321	1. 1. 323
leg 4	1. 1. 221	1. 1. 323

Endopodite of leg 2 notably big and flattened; apex of exopodite reaches upper third of 3rd endopodal segment. Legs 3 and 4 have normally developed endopodites.

Leg 5 (fig. 63*e*) with distinctly articulating exopodite, which is elongate-ovate, twice as long as broad and bears 5 spiniform setae: 2 at external margin, 2 at apex, and 1 at internal margin. Some small spinules are dispersed along the external margin. External lobe small, with fine seta and external row of spinules. Baso-endopodite small but broad, reaching as far as upper third of exopodite.

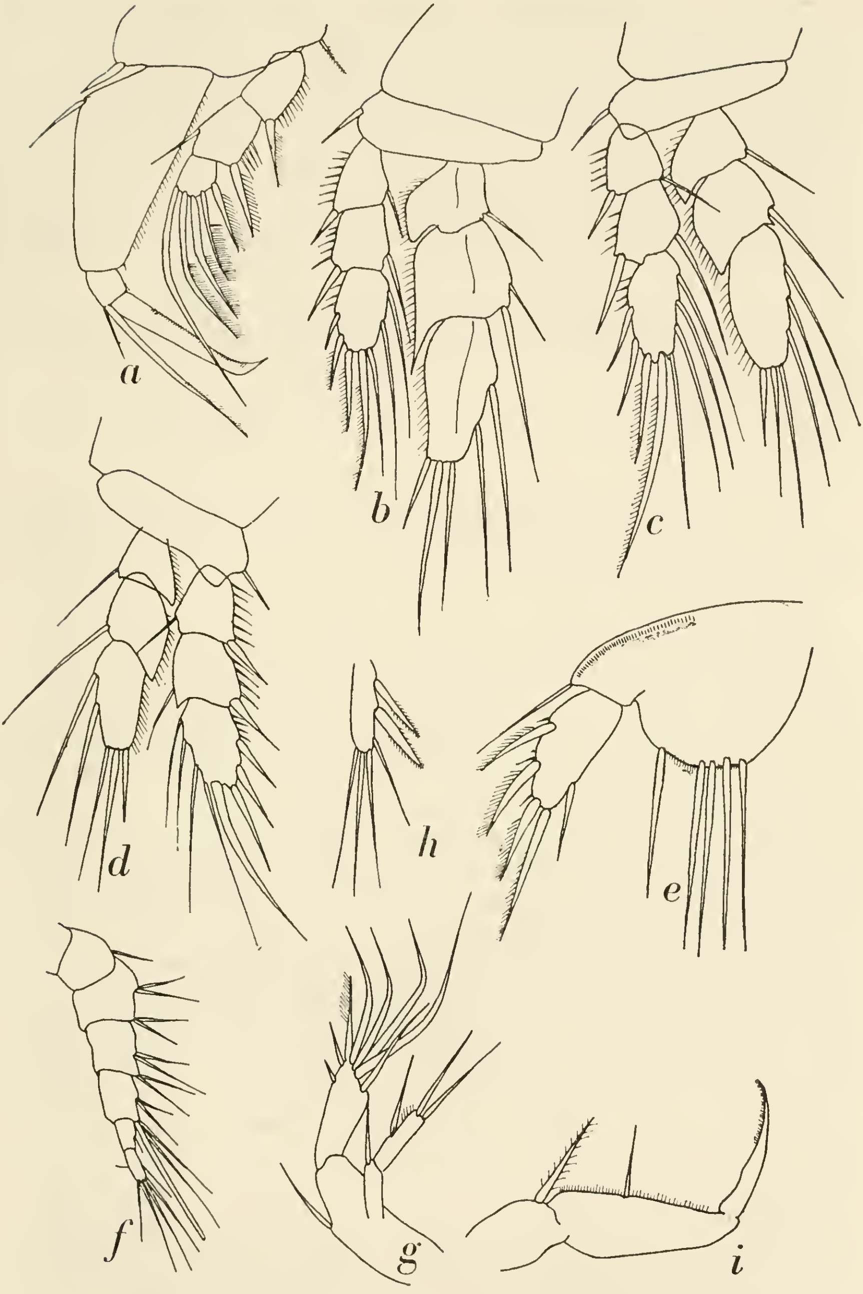

FIGURE 63.—*Idomene purpurocincta* (Norman and T. Scott), loc. 425, ad. ♀: *a*, leg 1; *b*, leg 2; *c*, leg 3; *d*, leg 4; *e*, leg 5; *f*, antennule; *g*, antenna; *h*, exopodite of mandibular palp; *i*, maxillipede. (×625.)

5 strong, nude spiniform setae inserting along spinulose border of baso-endopodite.

This specimen agrees with Norman and T. Scott's description of *Megarthrum purpurocinctum* (1906, p. 175) except for the following points:

1. Norman and T. Scott's specimen measured 0.5 mm., but the specimen here is smaller (0.30 mm.).
2. Spine and seta on 2nd endopodal segment of leg 1 are very short in Norman and T. Scott's drawing (pl. 14, no. 9) but they may have been drawn from a slightly oblique position of the segment.
3. The spines at the baso-endopodite appear to have been plumose in Norman and T. Scott's specimen (pl. 20, fig. 4); here they are long and nude.
4. The curious color pattern is completely faded in the present specimen.

The specimen from locality 431 is strongly contracted and curved; it shows the color pattern characteristic for this species as well as some additional structural particularities; its external appearance is described below (fig. 62*c*).

Adult female (loc. 431), 0.27 mm.; greatest diameter 0.14 mm. Cephalic somite, composed of fused head and 1st thoracic somite, anteriorly broadly rounded, almost semicircular, posteriorly concave. Posterolateral parts slightly produced. Epimeral plates of 2nd to 5th thoracic somites well developed, produced caudally, and well visible in dorsal aspect; caudally they increase in size. Even on the 5th thoracic somite there are well-developed epimeral plates, reaching as far as ⅗ the genital somite. They also cover the anterolateral parts of that somite. Cephalothorax remarkable further by development of small, chitinized ridges on walls of somites, visible along distal walls of cephalon and 1st thoracic somite. These chitinized ridges in reality are placed on the anterior part of the following somite (2nd and 3rd thoracic somites) and are covered by the posterior free part of the preceding somite in the stretched animal. The ridges are visible here because of the strongly curved body. They form a very prominent structural feature, they are visible in Sewell's figure 29a (1940) but they are not mentioned in his text. Neither are they visible in Norman and T. Scott's figures nor are they mentioned in the text.

Abdomen as in previous specimen, but genital somite slightly shorter and line of fusion less visible. Spinules on genital somite on sides near line of fusion and along distal border. Similar spinules on 3rd and 4th abdominal somites. Anal somite and furca as in previous female specimen, but furcal setae damaged. The color, though faded, can still be made out. Cephalic somite and abdomen transparently yellowish, thoracic somites 2 to 5 reddish brown.

Remarks.—This is an exceedingly rare species. It was based originally on a single female specimen, 0.5 mm. in length, from Salcombe, Devon, on the English Channel coast (Norman and T. Scott, 1905; 1906). Sewell (1940) records another female (0.38 mm. length) from off Burleigh Rock on Nancowry in the Nicobar Islands, where it was obtained from weed washings. The Ifaluk specimens also were obtained from weed washings.

Genus *Dactylopodella* G. O. Sars, 1905

The type of the genus *Dactylopodella* (=*Vallentinia* Norman and T. Scott, 1906) is *Dactylopus flavus* Claus, 1866. The following species are known:

Females	Males
Dactylopus flavus Claus, 1866	*D. flavus* Claus, 1866
D. rostratus T. Scott, 1893	*D. rostratus* T. Scott, 1893
Dactylopusia ornata Norman and T. Scott, 1905	*D. ornata* Norman and T. Scott, 1905
Dactylopodella clypeata G. O. Sars, 1911	

A new species will be described below as *Dactylopodella incerta*, new species, of which the female only is known. This species can be fitted into Lang's key in the following way:

Key to Species of *Dactylopodella*

1. Endopodite of leg 1, 2-segmented 2
   Endopodite of leg 1, 3-segmented . . . . **D. rostrata** (T. Scott)
2. 2nd endopodal segment of leg 1 with geniculate seta and claw. **D. ornata** (Norman and T. Scott)
   2nd endopodal segment of leg 1 with 2 claws 3
3. Endopodite leg 2, 3-segmented . . . . **D. incerta,** new species
   Endopodite of leg 2, 2-segmented 4
4. Abdomen ½ the length of cephalothorax . . . . **D. flava** (Claus)
   Abdomen ⅓ the length of cephalothorax . . . . **D. clypeata** G. O. Sars

Dactylopodella incerta, new species

Figures 64*a*,*b*, 65

Material.—Loc. 592, 2 ov. ♀♀, 0.44 and 0.48 mm., 1 ad. ♀, 0.44 mm.

Description.—The following is based on the ovigerous female specimen of 0.44 mm. length (holotype), which has been dissected and the appendages mounted. The remaining specimens are the paratypes.

Adult female, total length 0.44 mm.; greatest diameter 0.18 mm.; length of longest furcal seta 0.39 mm. Proportional length of cephalothorax and abdomen is 17:12.

Body robust, especially in dorsal aspect; cephalothorax ovoid, greatest diameter in region of oral appendages, sharply set off from abdomen (fig. 64*a*). Head and 1st thoracic somite completely fused to form cephalic somite, slightly longer than combined lengths of thoracic somites 2 to 4. Back, in lateral aspect, rounded, very gradually continuing into rostrum (fig. 64*b*). Rostrum strong, curved, triangular with blunt apex, pointing forward and slightly downward, equal in length to combined lengths of antennular segments 1 to 3. Rostral base visible in dorsal view as rounded eminence in front of cephalic somite, separated by very weak groove. Cephalic somite laterally produced to cover basal parts of oral appendages, laterodistal corner rounded. Thoracic somites 2 and 3 of same length, 4th somite slightly longer. All 3 somites with well-developed epimeral plates, cut off squarely in lateral aspect.

5th thoracic somite small, very visible in lateral aspect, slightly visible in dorsal aspect, as narrow band. Genital somite, resulting from fusion of somites 1 and 2, very prominent feature of abdomen, as long as rest of abdomen, furca included. Genital somite cylindrical, with distinct line of fusion, no spinules (fig. 64*a*). 3rd and 4th abdominal somites of equal length, strongly telescoped, nude. Anal somite well developed, with broad anal plate, deeply incised between insertion of furca. Two rows of fine spinules occur on each side of anal somite near insertion of furcal rami. Furcal rami slightly wider than long (proportion 4:3), with appendicular seta and 5 marginal setae on each ramus. Setae 1, 5, and appendicular seta short, 5th spiniform, 4th slightly longer. Setae 2 and 3 lengthened, especially 2nd which reaches about body length.

Antennules short, 7-segmented, 4th segment twice as long as broad, with fairly long tubercle carrying aesthetasc and 2 setae. During preparation, the appendage fragmentated, with the result that I could not figure the setation. Setae on basal 3 segments short and plumose; on apical segments long and apparently nude.

Antenna (fig. 65*g*) with small, 3-segmented exopodite, number of setae 2, 1, and 3, respectively. Allobasis with 1 internal seta. Endopodite with 7 terminal setae and 2 lateral spines. Of apical setae, 4 are geniculate, 2 are straight, and 1 is short, compressed and dagger-shaped.

Mandibular praecoxa well developed, with strong cutting edge bearing 5 blunt, strong teeth and long basal seta. Exopodite small, 2-segmented, with 1 and 4 setae respectively. Endopodite small, segmentation indistinct, with total of 5 setae (fig. 65*h*).

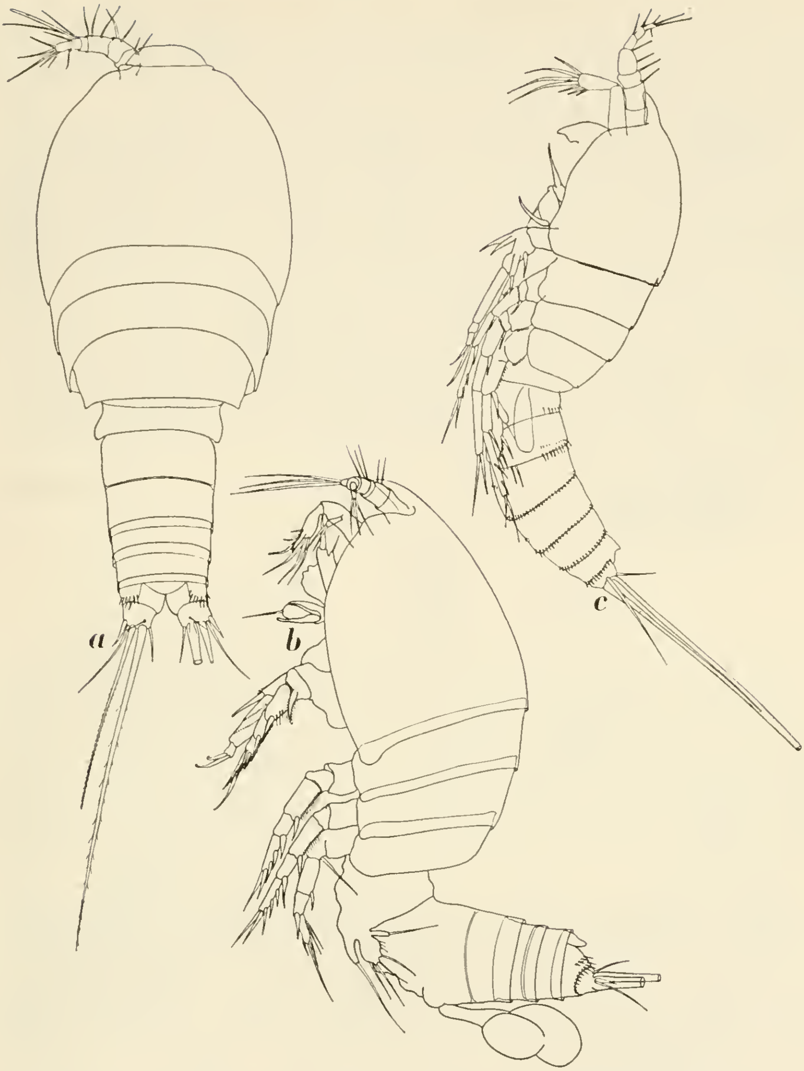

Figure 64.—*Dactylopodella incerta*, new species, loc. 592, ad. ♀, holotype: *a*, whole animal, dorsal view; *b*, same animal, lateral view from left side. *Parastenhelia spinosa* (Fischer), loc. 592, ad. ♂: *c*, whole animal, lateral view from left side. (× 165.)

Maxillule in unfavorable position in my preparation, with the result that I could not study its structure.

Maxilla (fig. 65*i*) with 2 small praecoxal and 1 small coxal endite, each with 2 setae. Basal endite well developed, coalescent with strong, curved spine with blunt apex. No setae were observed on the basal endite and no trace of an endopodite could be seen.

Maxillipede (fig. 65*j*) chelate, with short coxa, carrying 1 seta. Basis scarcely swollen, without setae. Endopodite present as a single, claw-shaped segment, tapering into fine point, slightly shorter than basis. There are no setae on the endopodite.

Exopodite of leg 1 (fig. 65*a*) 3-segmented, endopodite 2-segmented. Coxa with external swelling, carrying some spines. Basis at internal and external border with strong spine; spines and margins haired. Endopodite and exopodite of same length; 1st and 2nd exopodal segments elongated, of same length, each with external spine, 2nd with internal seta. 3rd exopodal segment small, with total of 5 appendages, 4 claws (increasing in size apically) and 1 seta. 1st endopodal segment styliform, 2½ times as long as wide, external margin strongly spinuous. Internal margin with seta halfway along its length. 2nd endopodal segment small, with 2 strong claws and some spinules.

The various details of the legs can best be taken from figure 65*b–d*; the setal formula is:

	endopodite	*exopodite*
leg 2	1.1.221	1.1.223
leg 3	1.1.321	1.1.323
leg 4	1.1.221	1.1.323

External margins of exopodites and endopodites set with spinules.

Leg 5 (fig. 65*e*) small, external lobe of baso-endopodite elongate, with fine seta. Exopodite twice as long as broad, with 5 long setae, proximal parts of internal and external margins spinulose. Baso-endopodite broad, reaching halfway along exopodite, with 4 long setae and 1 short seta, insertion of setae separated from exopodite by wide gap.

Ventral aspect of genital somite represented in figure 65*f*. Color completely faded in alcohol, yellowish green, transparent. No eye visible.

Remarks.—The setal formula of the specimen described indicates that it belongs in the subfamily Pseudotachidiinae. The 7-segmented antennules and a small antennal exopodite indicate either the genus *Idomene* or *Dactylopodella*. I have brought this new species to *Dactylopodella* because of the strong development of the rostrum and the scarcity of plumose setae on the antennules, but the distinction between both genera, at least in the sense expressed in Lang's definitions of these genera, is a bit vague and needs reconsideration. The present new forms differ from the species now in the genus *Dactylopodella* by the presence of hooked claws on the 3rd exopodal segment of leg 1 and the fairly distinct separation of the rostrum from the cephalic somite. It differs from *D. flava* and *D. clypeata* in the 3-segmented endopodite of leg 2, in which it approaches *D. rostrata* (3-segmented endopodite of leg 1) and *D. ornata*. From the latter it differs by the armature of 2nd endopodal segment of leg 1.

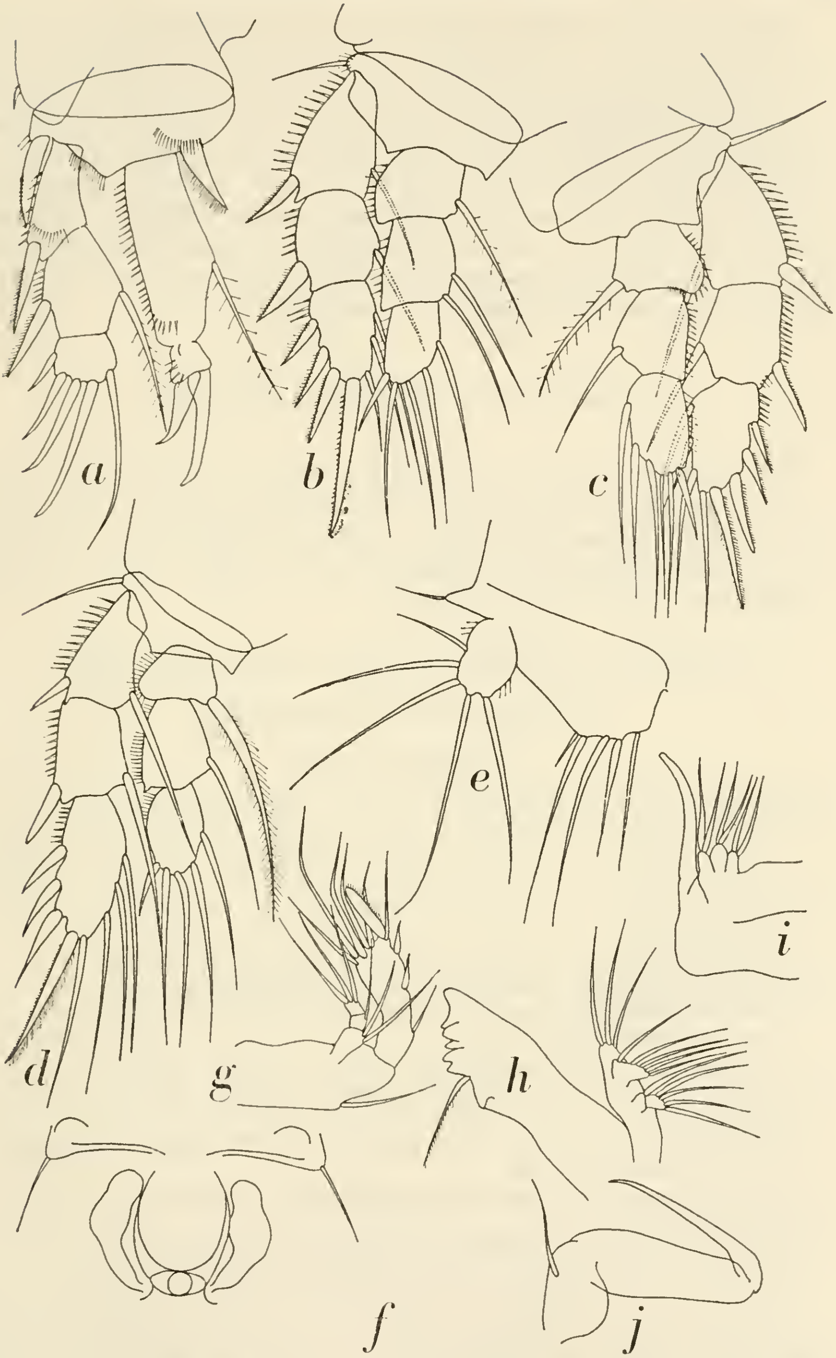

FIGURE 65.—*Dactylopodella incerta*, new species, loc. 592, ad. ♀, holotype: *a*, leg 1; *b*, leg 2; *c*, leg 3; *d*, leg 4; *e*, leg 5; *f*, genital somite, ventral view; *g*, antenna; *h*, mandible; *i*, maxilla; *j*, maxillipede. (× 520.)

The present new species approaches *Idomene kabylica* Monard, 1936, in many respects. Yet a comparison with Monard's original diagnosis reveals several points of difference, e.g., the 6-segmented antennules with their long 3rd segment, differences in structure of the mandibular palp, and small differences in the comparative lengths and shape of endopodal and exopodal segments of the legs. There remain many points of similarity, and the suggestion that the differences between both species are due to incompleteness in Monard's description of his only female specimen cannot altogether be avoided. Monard's specimen, an ovigerous female, measured 0.7 mm.

Family Parastenheliidae Lang, 1944

This family, as it has been defined by Lang (1944, p. 13; 1948, p. 584) has but a single genus, *Parastenhelia* Thompson and A. Scott, 1903 (=*Microthalestris* G. O. Sars, 1905; *Thalestrella* Monard, 1935a), type species *Harpacticus spinosus* Fischer, 1860. Only this type species occurs in the Ifaluk collection.

Genus *Parastenhelia* Thompson and A. Scott, 1903

Parastenhelia spinosa (Fischer, 1860)

FIGURES 64*c*, 66–70

Harpacticus spinosus Fischer, 1860, p. 665, pls. 21 (figs. 51–53), 22 (fig. 66).

Parastenhelia spinosa.—Lang, 1944, p. 13.—Dahl, 1948, p. 96.—Lang, 1948, p. 588, fig. 240 (no. 1).—Klie, 1949, p. 126.—Caspers, 1951, p. 65.—Noodt, 1955a, p. 203.

Parastenhelia spinosa var. *littoralis*.—Dahl, 1948, p. 96.—Roe, 1958, p. 228; 1960, p. 280.

Parastenhelia spinosa var. *penicillata*.—Roe, 1958, p. 228; 1960, p. 280.

Microthalestris littoralis.—Vàtova, 1928, p. 181.—Fraser, 1936, p. 26.

Parastenhelia littoralis.—Sewell, 1940, pp. 127, 129, 191, 357, 363, 365, 366, 369, 370, 372–376, fig. 26.

Parastenhelia littoralis var. *scotti* Sewell, 1940, pp. 127, 195, 357, fig. 28.

Parastenhelia littoralis var. *penicillata*.—Sewell, 1940, pp. 127, 129, 189, 193, 375, fig. 27.

Microthalestris forficula.—Fraser, 1936, pp. 25, 26.—Marine Biological Association, 1931, p. 162; 1957, p. 166.

Parastenhelia forficula.—Sewell, 1940, pp. 127, 129.—Klie, 1941, p. 23.—Nicholls, 1945, p. 3, fig. 2A.

Parastenhelia forficula var. *littoralis*.—Nicholls, 1945, p. 4, fig. 2B.

MATERIAL.—Loc. 589, 4 ad. ♀♀, 0.29–0.47 mm. (0.37 mm.); 2 ad. ♂♂, 0.38 and 0.65 mm. Loc. 590, 3 ad. ♂♂, 0.27–0.39 mm. (0.34 mm.). Loc. 592, 1 ad. ♀, 0.52 mm.; 1 ad. ♂, 0.42 mm. Loc. 638, 5 ad. ♀♀, 0.30–0.32 mm. (0.31 mm.); 1 ad. ♂, 0.29 mm.

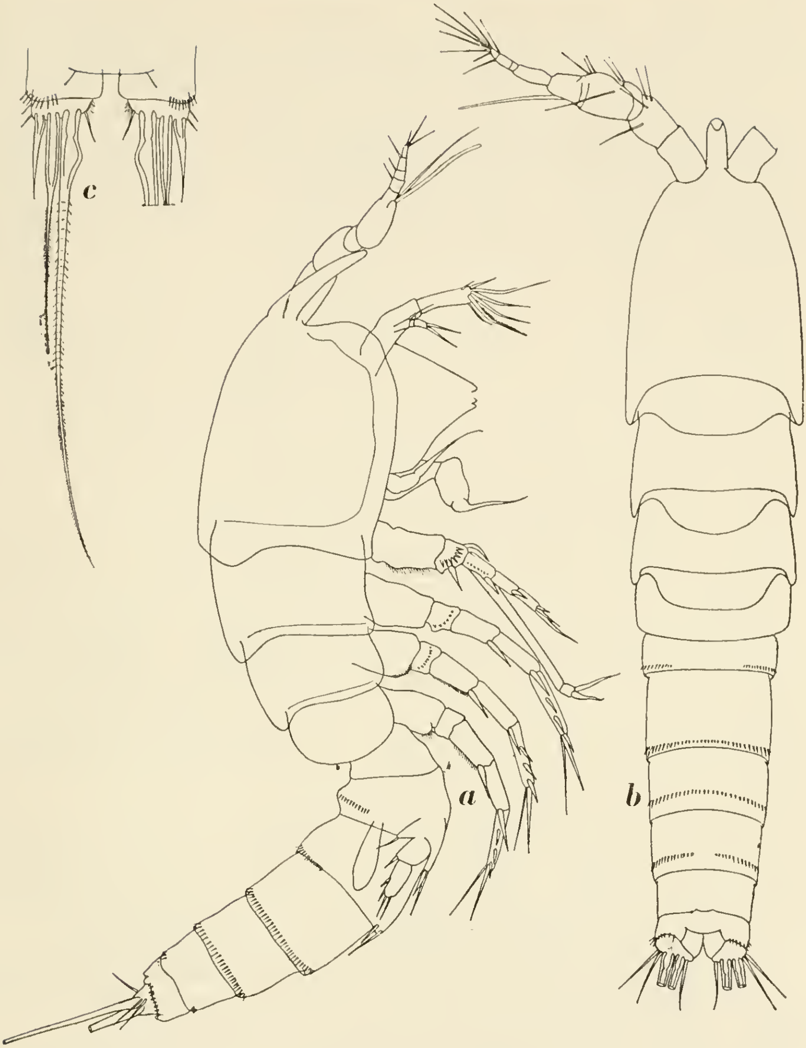

Figure 66.—*Parastenhelia spinosa* (Fischer), loc. 590, ad. ♂: *a*, whole animal, lateral view from right side; *b*, same animal, dorsal view; loc. 592, ad. ♀: *c*, furcal rami, ventral view. (× 275.)

Introductory Notes.—I have not attempted to split this very variable species into varieties, chiefly because the available material is not extensive enough. Lang has assembled arguments in favor of a very broad concept of this species, including all the forms and varieties that in the course of time have been described, but leaving *Parastenhelia ornatissima* (Monard, 1935a), *P. hornelli* Thompson and A. Scott, 1903, *P. anglica* Norman and T. Scott, 1905, and *P.*

gracilis Brady, 1910, as separate species. I have the impression, however, that a thorough study of specimens from the localities from which the above-named species have been recorded will show that some of these species at least must be sunk into the synonymy of *P. spinosa* (Fischer) in the very wide sense defined by Lang, but such a study might show as well that a certain combination of characters can be restricted geographically and could be used for a badly needed subdivision of this remarkable species. That Lang's views are not accepted generally is demonstrated by Roe's records of *P. spinosa* var. *littoralis* and *P. spinosa* var. *penicillata* from the Irish coasts.

I failed to make a satisfactory division of the Ifaluk material of *P. spinosa* and I have concluded by recording them all under that name. Apart from Lang's final solution of the complicated problem of variability in this form, he is certainly right in drawing attention to the futility of characters or the combination of characters so far used to discriminate between the various varieties.

The bulk of the Ifaluk material, though greatly variable in length, corresponds with the previous form *typica* Lang, 1934. The antennule is 9-segmented in the female, the 2nd furcal seta slightly swollen at the base, the setae on endopodite of the antenna normally developed, the exopodite of leg 1 with slender appendages. 2nd endopodal segment of leg 1 lengthened, 4 to 5 times as long as wide, internal seta inserting near apex. There is 1 internal seta on the 3rd endopodal segment of leg 4; on leg 5 there are 8 setae on the exopodite; in the male the exopodite is 3-segmented and bears 6 setae. Anal plate in some specimens finely spinulose.

A female and a male specimen from locality 592, to be described below, represent what might formerly have been called form *penicillata* Willey, 1935; a female and a male from locality 589 approach *P. hornelli* in several respects and will also be described below.

In conclusion it may be remarked that the setal formula in this species is apparently variable to a much greater degree than in other genera of Harpacticoida and thus has only a restricted value.

Description.—All specimens fragmented very easily during dissection and I failed to obtain complete dissections of a single specimen. None of the specimens can therefore be completely described.

Adult female (loc. 592), total length 0.52 mm.; proportional length of cephalothorax and abdomen is 18:17.

Shape of body as in form *typica*, further characterized by relatively small rostrum and fairly long, 8-segmented antennules (fig. 67). Antenna (fig. 68*d*) with 2 well-developed spines with pectinate bristles. Maxillipedes with coronula of spinules on basis. Exopodite of leg 1 with short, dagger-shaped appendages. 2nd segment of endopodite of leg 1 styliform, 5 times as long as wide, appendages on 3rd endopodal segment of pectinate type. Legs 2 to 4 with strongly spinulose

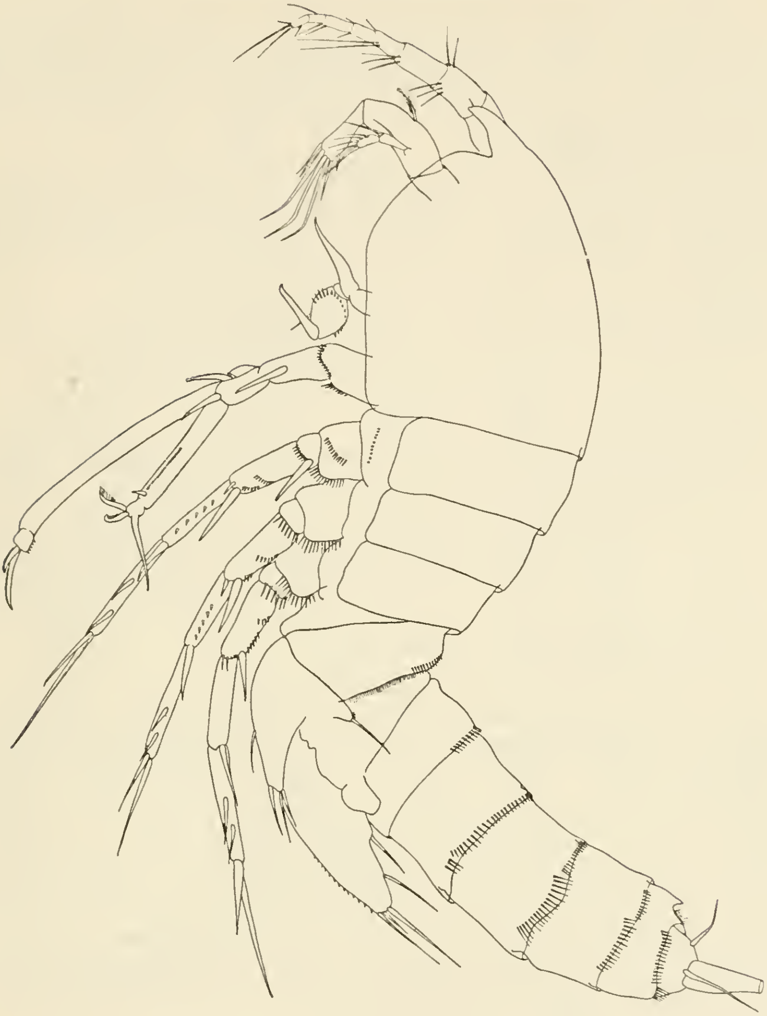

FIGURE 67.—*Parastenhelia spinosa* (Fischer), loc. 592, ad. ♀: whole animal, lateral view from left side. (× 275.)

external margins. Leg 5 with spinulose exopodite, bearing 6 setae. 5th thoracic somite and abdominal somites with laterodorsal spinules. Setae 2 and 3 of furca swollen at base, especially 2nd; 4th seta short, spiniform (fig. 66*c*).

Color completely faded, no eyespot visible.

Adult male (loc. 592), total length 0.42 mm.; length of longest furcal seta 0.27 mm. In general appearance the male resembles the female. It is slightly slenderer and the rostrum shorter, with a very blunt apex (fig. 64*c*). 5th thoracic somite and abdominal somites, as in female, with laterodorsal spinules along distal ends of somites. Spermatophore visible in abdominal somites 1 and 2. Anal somite short, shorter than preceding somite, with strongly developed spinules along insertion of furcal rami. Furca as in female, 2nd seta with smaller basal swelling.

Antennules subchirocerate, 7-segmented, 4th segment of considerable length, with swollen basal portion, apparently resulting from fusion of several segments. There is a small conical swelling bearing the aesthetasc and two setae, in front of which a short spine may be observed, forming a part of the clasping organ.

Antenna (fig. 70*g*) as in female with 2 pectiniform spines on endopodite. Exopodite 2-segmented, with 2 and 4 setae respectively.

Basis of leg 1 (fig. 70*a*) with 2 very strong spines, 1 internal and 1 external, pointing slightly upward. Endopodite 2-segmented; 1st segment styliform, internal seta almost apical, 2nd endopodal segment small, 2 of setae spiniform, with pectinate bristles (fig. 70*b*). Endopodite of leg 3 modified; structure appears in figure 70*d*. Exopodite of leg 5 (fig. 70*f*) ovate, unsegmented, 2½ times as long as wide, with 7 marginal setae: 3 external, 2 apical, and 2 internal. Baso-endopodite overlapping distal ⅔ of exopodite, with 2 apical setae and small hyaline area near insertion of exopodite.

Adult female (loc. 589), total length 0.33 mm.

General shape of body as in above-described specimens, but slightly slenderer; division between cephalothorax and abdomen not distinctly marked (fig. 68*a*). Head and 1st thoracic somite fused to form cephalic somite, which is shorter than combined lengths of thoracic somites 2 to 4. Lateral parts of cephalic somite produced, broadly rounded, covering basal parts of oral appendages. Epimeral plates of thoracic somites 2 to 4 well developed, rounded; somites of equal length. Rostrum bigger than in remaining specimens, as long as antennular segments 1 and 2, in dorsal aspect slender, apex rounded, separated from cephalic somite by a groove.

5th thoracic somite small. Separation between 1st and 2nd abdominal somites, forming genital somite, fairly distinct; somites have about same length and are equal in length to 3rd and 4th somites. Spinules occur on 2nd and 3rd abdominal somites in the positions indicated in figures 68*a*,*b*. Anal somite short, anal flap very broadly rounded, bordered by hairlike spinules. A row of spinules also occurs along insertion of furcal rami.

Antennules long, only slightly shorter than cephalic somite, 8-segmented, segments 2 and 3 long, segment 4 small, with long conical process bearing aesthetasc and 2 setae.

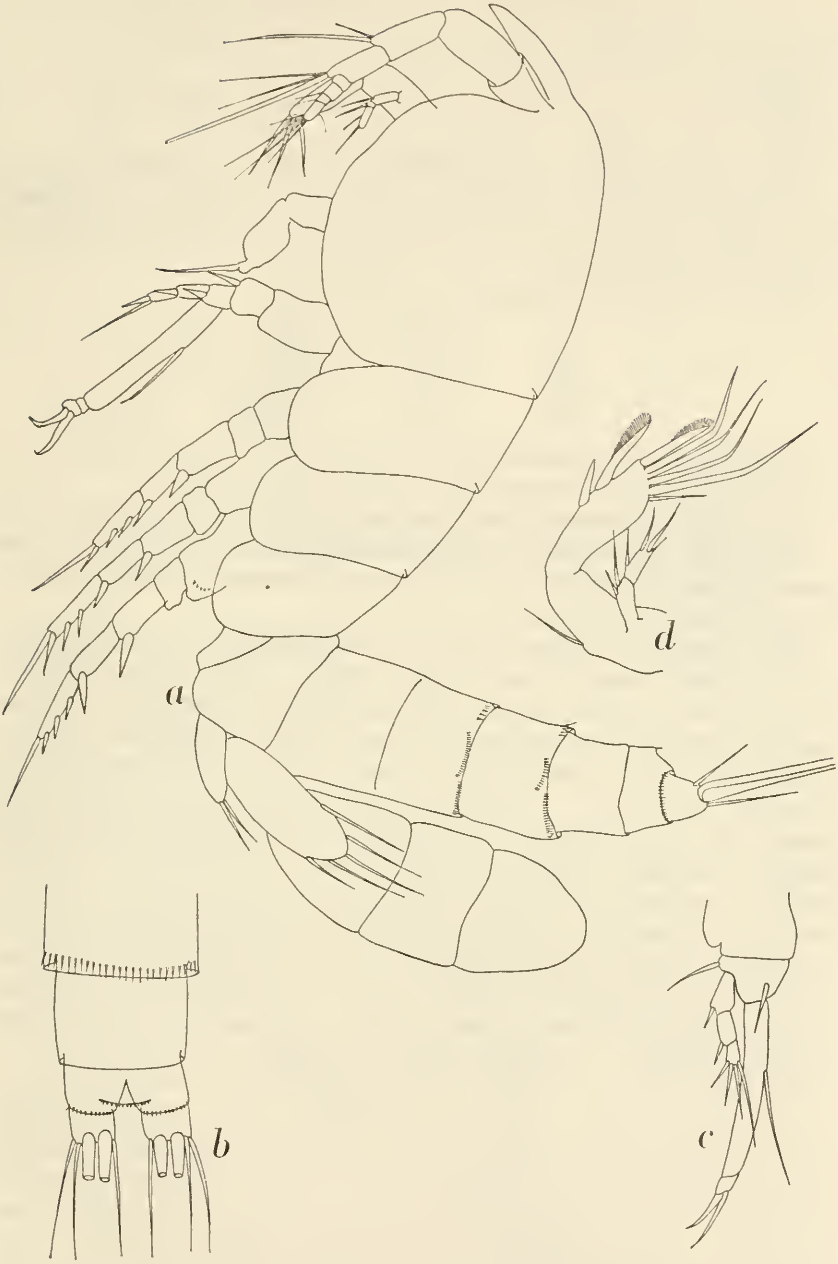

FIGURE 68.—*Parastenhelia spinosa* (Fischer), loc. 589, ad. ♀: *a*, whole animal, lateral view from left side; *b*, distal part of abdomen, dorsal view; *c*, leg 1; ad. ♀, loc. 592: *d*, antenna. (× 460.)

Antenna with allobasis and 2-segmented exopodite, bearing 2 and 4 setae on the segments. Setae and spines of endopodite normally developed.

Mouth parts not studied in detail; maxillipede without spines on basis.

Leg 1 with 2-segmented endopodite, 1st segment styliform, internal seta attached above middle of segment. 2nd segment of exopodite only slightly longer than 3rd, the latter with normally developed setae and spines (fig. 68*c*).

Legs 2 to 4 have the following setal formula:

	endopodite	*exopodite*
leg 2	1.1.121	1.1.123
leg 3	1.1.221	0.1.323
leg 4	1.1.221	0.1.323

Exopodite of leg 5 rather slender, 2½ times as long as wide, with 6 marginal setae, not differing from type described above.

The specimen carries a ball composed of 3 remarkably large eggs.

Adult male (from locality 590, corresponding with female described above), total length 0.39 mm.; greatest diameter 0.05 mm.; length longest furcal seta 0.12 mm.

Body, especially in dorsal view, at once striking by extreme slenderness and long, slender rostrum (fig. 66*b*). Head and 1st thoracic somite fused; cephalic somite with parallel sides, anteriorly slightly tapering, suddenly contracted at basal parts of antennules. Posteriorly body tapers gradually; division between cephalothorax and abdomen very weak. Division between thoracic somites distinctly marked by constrictions, length of cephalic somite equal to combined length of thoracic somites 2 to 4. Back in lateral view smoothly rounded, gradually continuing into curved, slender rostrum, separated from cephalic somite by shallow groove (fig. 66*a*). Rostrum slender, as long as antennular segments 1 and 2, apex curved inward. Median parts of distal margin of cephalic somite and thoracic somites 2 and 3 backwardly produced to form saddle, covering beginning of each following somite. 4th thoracic somite distally cut off squarely.

5th thoracic somite small, laterodorsally with row of spinules, interrupted medially. Abdominal somites 2 and 3 of equal length; 1st (genital) somite slightly longer, 4th slightly shorter. Spinules occur on genital somite (dorsally and laterally), 2nd and 3rd somites (completely closed distal row), and on 4th somite (dorsally and ventrally). Anal somite small, anal flap broadly rounded, nude. Insertion of furcal rami bordered by spinules. Furcal rami with usual 5 marginal setae and 1 appendicular seta. Setae 2 and 3 lengthened and thickened, not swollen at base. Seta 4 fine, not spiniform.

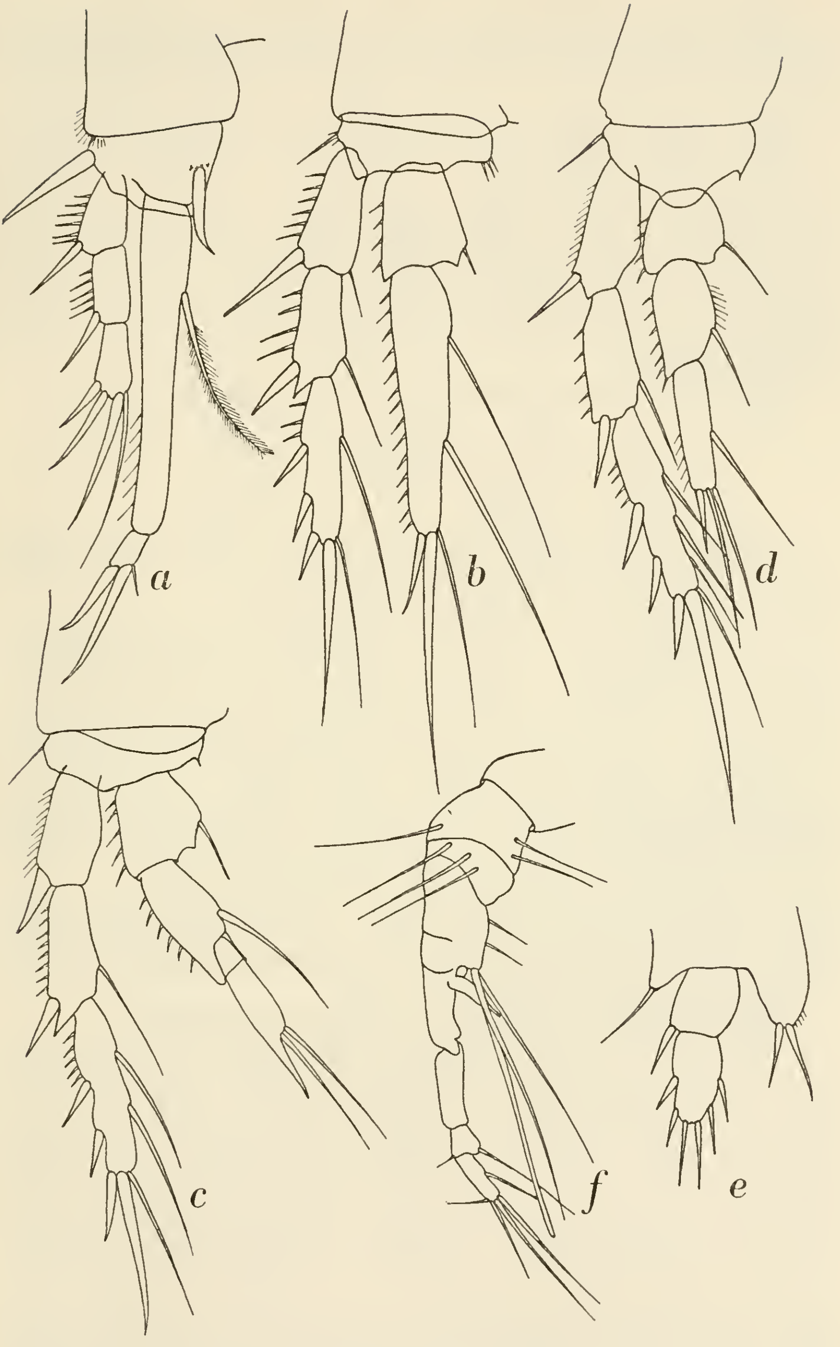

FIGURE 69.—*Parastenhelia spinosa* (Fischer), loc. 590, ad. ♂: *a*, leg 1; *b*, leg 2; *c*, leg 3; *d*, leg 4; *e*, leg 5; *f*, antennule. (× 625.)

Antennules (fig. 69*f*) subchirocerate, 9-segmented; segment 3 small, segments 4 and 5 almost fused to form swollen base of hinge, with small process bearing aesthetasc and 2 setae. Ultimate segment very small.

Antenna with normally developed setae on endopodite, allobasis, and 2-segmented exopodite.

Leg 1 (fig. 69*a*) with strongly developed spines on basis, internal spine curved inward, external spine straight. Endopodite 2-segmented, 1st segment styliform, seta at internal margin inserting at upper third. Exopodite 3-segmented, segments of nearly equal length; appendages of exopodite normally developed, external margin strongly spinulose.

Legs 2 to 4 (figs. 69*b–d*) with the following setal formula:

	endopodite	*exopodite*
leg 2	1.221 (modified)	1.1.123
leg 3	1.1.021 (modified)	0.1.223
leg 4	1.1.121	0.1.2(3)23

Endopodite of leg 2 modified, 1st segment normally developed, 2nd segment lengthened, reaching apex of exopodite. There are 2 internal, 2 apical, and 1 external (subapical) setae (fig. 69*b*).

Endopodite of leg 3 also modified. 1st segment normally developed, with short internal seta. Segment 2 with external conical process, forming part of hollowed cylinder, fitting around basal part of segment 3; 1 internal seta. 3rd segment with external apical process, which may represent seta fused to segment, and 2 apical setae (fig. 69*c*).

Leg 4 normally developed; apex of endopodite reaching halfway along 3rd exopodal segment. There is an exceedingly fine third internal seta on that segment of the exopodite (fig. 69*d*).

Exopodite of leg 5, 2-segmented; apex of baso-endopodite reaching the articulation, with 2 apical setae. 1st exopodal segment with external spine; 2nd segment with 2 apical spines, 2 apical setae, and 2 internal marginal setae (fig. 69*e*).

Color completely faded, no eye or pigmented spot visible.

REMARKS.—The two specimens from locality 590 described above approach *Parastenhelia hornelli* Thompson and A. Scott, 1903, in the structure of the exopodite of leg 1, where the 3 segments have about the same length. This species, which has never again been recorded after the original record from the pearl oyster banks around Ceylon, is much larger (♀ about 1 mm., ♂ 0.8 mm.) and has a different setation of the legs (as far as these have been described). Since the specimens found in the Ifaluk collection have the setal formula characteristic for *P. spinosa* and since some variability in the structure of leg 1 in this very variable species seems very likely, I have recorded the specimens as *P. spinosa*. *P. ornatissima* (Monard, 1935a), a

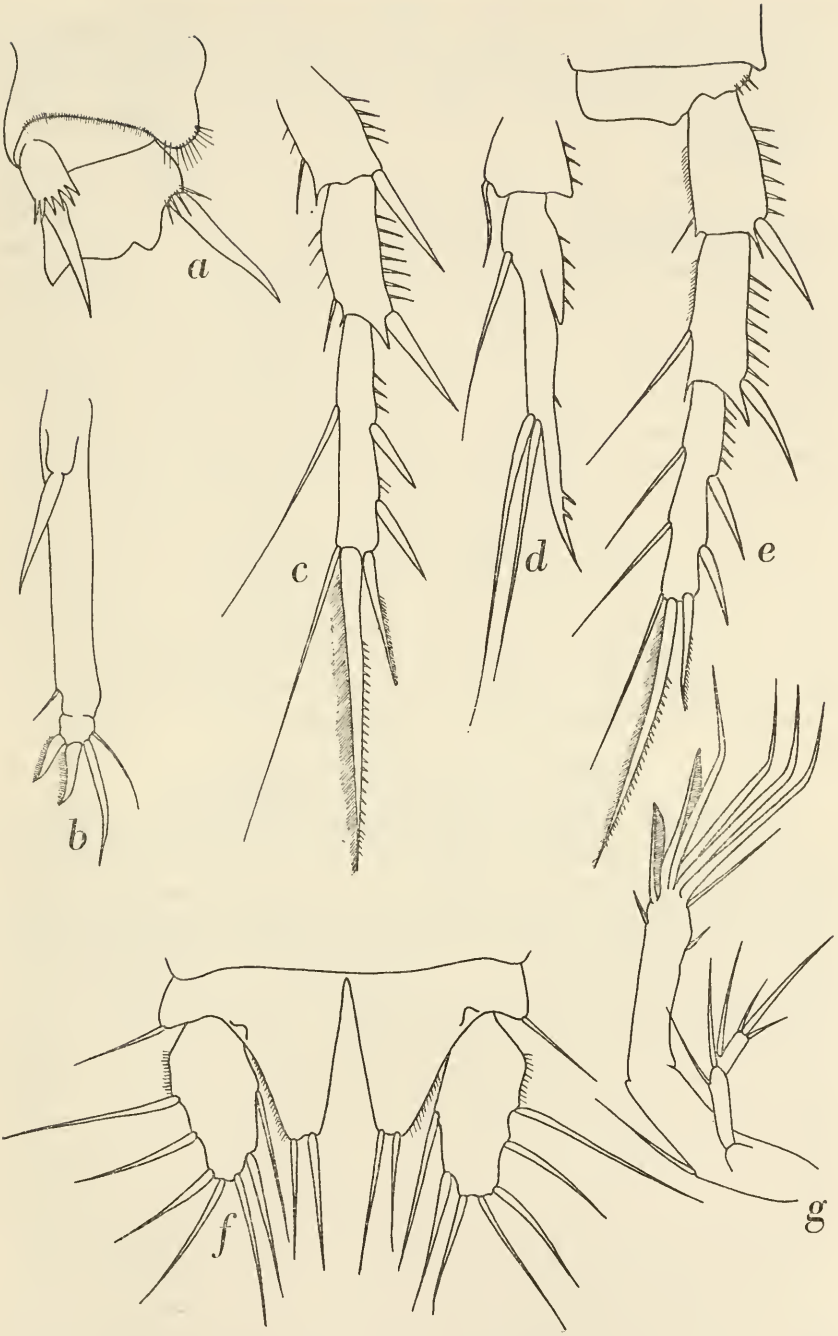

FIGURE 70.—*Parastenhelia spinosa* (Fischer), loc. 592, ad. ♂: *a*, proximal part leg 1; *b*, endopodite leg 1; *c*, exopodite leg 2; *d*, endopodite leg 3; *e*, exopodite leg 3; *f*, 5th legs; *g*, antenna. (× 625.)

species of which only the female is known and which has been found at Roscoff along the Atlantic coast of France, has the anal operculum bordered with spinules, according to Monard's description (1935a, p. 45, figs. 87–96), but here again the setal formula, notably of leg 2, is different.

The species, varieties included, has a very wide distribution, especially in the Atlantic, where it occurs from the Arctic seas, along American, European, and African coasts, down into the Antarctic seas. Its distribution has been discussed by Lang (1948, p. 589) and summarized by Sewell (1940, pp. 191–196). Further localities are: the Helgoland area of Germany (Klie, 1941); the Plymouth area of England (Fraser, 1936; Marine Biological Association, 1931, 1957); the Dalkey area of County Dublin and Lough Ine of County Cork, both in Ireland (Roe, 1958, 1960); Teneriffe in the Canary Islands (Noodt, 1955a); the Rovinj, Yugoslavia, area in the Adriatic (Vàtova, 1928); the Stalin area on the Black Sea coast of Bulgaria (Caspers, 1951); Leander Point at Port Denison in Western Australia (Nicholls, 1945); and Addu Atoll in the Maldive Archipelago (Sewell, 1940). Though comparatively few Pacific records are available, the occurrence of this common form in the Ifaluk material is not surprising and fits quite well in the pattern of distribution. The species occured in three sand samples, taken at various intervals from the reef margin at Falarik, and in a sample taken from crevices.

Family Diosaccidae G. O. Sars, 1906

The subdivisions of this large family and the definition of its various genera is complicated slightly by the fact that the Diosaccidae have been treated independently by Nicholls (1941b) and Lang (1944, 1948). Lang, when he wrote his monograph, was unaware of Nicholls' paper, but it has been discussed in an appendix to Lang's monumental paper. It seems apparent that Lang's system of subdivisions of the Diosaccidae must be preferred far above Nicholls' attempt. The definition of the various, usually small, generic complexes in Lang's paper is quite clear, based on an appreciation of characters of both females and males and marked by distinctly indicated types. That some of Lang's genera, e.g., his (much reduced) genus *Amphiascus* G. O. Sars, 1905, sensu Lang, are still heterogeneous is due mainly to our knowledge, still far from complete, of its various species. Nicholls, however, has introduced generic names which, for priority reasons, cannot be neglected altogether and shortly will be discussed here.

Nicholls' genus *Mesamphiascus*—if we consider how its various species should be distributed according to Lang's monograph—is exceedingly heterogeneous, a fact of which Nicholls already was convinced: "This group is a somewhat arbitrary collection of species showing considerable range in setation, some species such as *amblyops* having the number of setae approaching that of *Amphiascopis*, while others show a reduced setation approaching the condition in the next genus [*Amphiascoides*]" (1941b, p. 79). The following list shows the species that Nicholl's assigned to the genus *Mesamphiascus* and their present designation:

imus	*Bulbamphiascus imus* (Brady, 1872)
denticulatus	*Bulbamphiascus denticulatus* (I. C. Thompson, 1893)
blanchardi	*Typhlamphiascus blanchardi* (T. and A. Scott, 1893)
erythraeus	*Robertgurneya similis* (A. Scott, 1896)
confusus	*Typhlamphiascus confusus* (T. Scott, 1902)
simulans	*Robertgurneya similis* (A. Scott, 1896)
varians	*Amphiascus varians* (Norman and T. Scott, 1905)
pacificus	*Amphiascus pacificus* G. O. Sars, 1905
exiguus	*Haloschizopera exigua* (G. O. Sars, 1906)
parvus	*Amphiascus parvus* G. O. Sars, 1906
propinquus	*Amphiascus propinquus* G. O. Sars, 1906
sinuatus	*Amphiascus sinuatus* G. O. Sars, 1906
tenellus	*Amphiascus tenellus* G.O. Sars, 1906
typhlops	*Typhlamphiascus typhlops* G. O. Sars, 1906
amblyops	*Amphiascus amblyops* G. O. Sars, 1911
bulbifer	*Haloschizopera bulbifer* (G. O. Sars, 1911)
lagenirostris	*Rhyncholagena lagenirostris* (G. O. Sars, 1911)
normani	*Bulbamphiascus imus* (Brady, 1872)
typhloides	*Typhlamphiascus typhloides* (G. O. Sars, 1911)
spinifer	*Robertgurneya spinifer* (Farran, 1913)
angustipes	*Amphiascus angustipes* Gurney, 1927
junodi	*Haloschizopera junodi* (Monard, 1935a)
mathoi	*Haloschizopera mathoi* (Monard, 1935)
salammboi	*Teissierella salammboi* (Monard, 1935)
gautheri	*Amphiascus gautheri* Monard, 1936

In regard to the selection of a type for his genus *Mesamphiascus*, Nicholls (1941b, p. 79) states: "It is, however, difficult to select a type species, but perhaps *parvus* Sars (1906, p. 162, pl. clii) is suitable, occupying a more or less central position in the genus, etc." It appears, therefore, that the designation of a type for the genus is ambiguous and, on this ground alone, the genus would have to be rejected. The genus, moreover, in the sense of Nicholls, cannot be maintained but would have to be restricted—an impossible task since the definition is very vague: ". . . *Amphiascus* having two and one inner setae on the middle segments of the second and third endopods respectively" (loc. cit.).

Humes (1953, pp. 368, 371) has used the genus *Mesamphiascus* to accommodate a new specices, described as *M. ampullifer*, recovered from the mouth parts of *Homarus americanus* Milne Edwards—a very uncommon copepod habitat. I cannot endorse Humes' view. That Humes experienced difficulties in his attempts to fit his new species into one of Lang's genera and that, as a result, he found the differences between his new species and those genera as big as those now recognized to exist between Lang's many genera is not surprising if the curious habitat, which must lead to structural differences, is considered. That, on the other hand, the species should fit into Nicholls' genus *Mesamphiascus* is not surprising at all if the very wide limits of this impossible genus are borne in mind. I must also contradict emphatically the choice by Nicholls that *Amphiascus parvus* G. O. Sars, 1906, is the type of the genus *Mesamphiascus* (see above). If this choice should be maintained, for which I see no reason for it to be done, *Mesamphiascus* Nicholls, 1941, sensu Humes, and *Amphiascus* G. O. Sars, 1905, sensu Lang, would become subjective synonyms. The best solution undoubtedly would be to erect a new genus for the reception of *Mesamphiascus ampullifer* Humes, 1953—which will find its place in the immediate vicinity of *Amphiascus* G. O. Sars, 1905, sensu Lang, from which it is primarily differentiated by the setation of the 3rd exopodal segment of leg 4, having only 2 setae at the internal margin, while 3 occur in *Amphiascus*.

Nicholls' genus *Amphiascoides* has been defined properly by its author (1941b, p. 81), and a distinct type, *Dactylopus debilis* Giesbrecht, 1881, has been selected. Still, in Nicholls' sense, it is too wide and would include species attributable to widely different genera, as the following list clearly shows:

debilis	*Amphiascella debilis* (Giesbrecht, 1881)
intermedius	*Paramphiascella intermedia* (T. Scott, 1896)
vararensis	*Paramphiascella vararensis* (T. Scott, 1896)
hyperboreus	*Paramphiascella hyperborea* (T. Scott, 1903)
neglectus	*Amphiascella neglecta* (Norman and T. Scott, 1905)
pygmaeus	*Haloschizopera pygmaea* (Norman and T. Scott, 1905)
hispidus (?)	*Paramphiascella hispida* (Brady, 1880)
nanus	*Amphiascella nana* (G. O. Sars, 1906)
nanoides	*Amphiascella nanoides* (G. O. Sars, 1911)
spinulosus	*Robertgurneya spinulosa* (G. O. Sars, 1911)
speciosus	*Amphiascella brevifurca* (Czerniavski, 1868)
dictydiophorus	*Robertgurneya dictydiophora* (Monard, 1924)
invaginatus	*Paramphiascella invaginata* (Monard, 1926)
sterilis	*Amphiascella sterilis* (Monard, 1926)
rostratus	*Robertgurneya rostrata* (Gurney, 1927)
commensalis	*Paramphiascella commensalis* (Seiwell, 1928)
ctenophorus	*Robertgurneya rostrata* (Gurney, 1927)
ilievecensis	*Robertgurneya ilievecensis* (Monard, 1935a)
roberti	*Paramphiascella roberti* (Monard, 1935a)
intermixtus	*Amphiascella subdebilis* (Willey, 1935)
subdebilis	*Amphiascella subdebilis* (Willey, 1935)
ecaudatus	*Robertgurneya ecaudata* (Monard, 1936)
langi	*Paramphiascella langi* (Monard, 1936)
robertsoni	*Paramphiascella robertsoni* (A. Scott, 1902)

From this list it would appear that a necessary restriction of the genus *Amphiascoides* would meet with as many difficulties as in *Mesamphiascus*, but, fortunately, it can be restricted because of its clearly fixed type: *Dactylopus debilis.* This type makes Lang's genus *Amphiascella*, type species *Stenhelia neglecta* (Norman and T. Scott, 1905) (=*Amphiascus linearis* G. O. Sars, 1906), a subjective synonym of *Amphiascoides* Nicholls, 1941. In this respect, following other authors such as Noodt (1955, p. 74), I have rejected the genus *Amphiascella* and substituted the generic name *Amphiascoides*, type species *Dactylopus debilis* Giesbrecht, 1881, and I have applied to it the restricted diagnosis of Lang's former genus *Amphiascella.* The species now attributable to this genus are discussed on p. 232.

Since the publication of Lang's paper, many new forms of Diosaccidae have been introduced; I have not, however, at this stage attempted to assemble all information concerning these new species since this would involve more time than I have available at present

Genus *Amphiascus* Sars, 1905

Amphiascus minutus (Claus, 1863)

FIGURES 71, 72

Dactylopus minutus Claus, 1863, p. 126, pl. 16 (figs. 14, 15).

Amphiascus minutus.—Marine Biological Association, 1931, p. 163.—Fraser, 1936, pp. 25, 26.—Nicholls, 1939, p. 261.—Sewell, 1940, p. 126.—Nicholls, 1941b, pp. 69, 74, 75, 77.—Lang, 1944, p. 15.—Dahl, 1948, p. 98.—Lang, 1948, p. 649, figs. 261 (no. 1), 262.—Klie, 1950, p. 76, figs. 53, 54.—Petkovski, 1955b, p. 218.—Maghraby and Perkins, 1956, p. 491.—Marine Biological Association, 1957, p. 163.—Noodt, 1957, p. 153.—Roe, 1958, p. 229; 1960, p. 280.

MATERIAL.—Loc. 589, 2 ov. ♀♀, 0.39 mm.; 1 ad. ♀, 0.32 mm.; 4 ad. ♂♂, 0.29–0.34 mm. (0.32 mm.). Loc. 590, 1 ov. ♀, 0.32 mm., 3 eggs. Loc. 591, 1 ad. ♀, 0.39 mm.; 1 ad. ♂, 0.27 mm. Loc. 594, 1 ad. ♀, 0.31 mm. Loc. 638, 1 ad. ♀, 0.27 mm.

DESCRIPTION.—The following is based on the female specimen from locality 591; some notes are added on an aberrant specimen from locality 594.

Adult female (from locality 591), 0.39 mm.; greatest diameter 0.09 mm.

Body, especially in dorsal aspect, slender, greatest diameter at 3rd thoracic somite, gradually narrowing anteriorly and posteriorly, without distinct separation between cephalothorax and abdomen (fig. 71*a*). Head and 1st thoracic somite fused, length equal to combined lengths of thoracic somites 2 to 5. Line of back in lateral aspect smoothly curved, sides produced to shield oral appendages

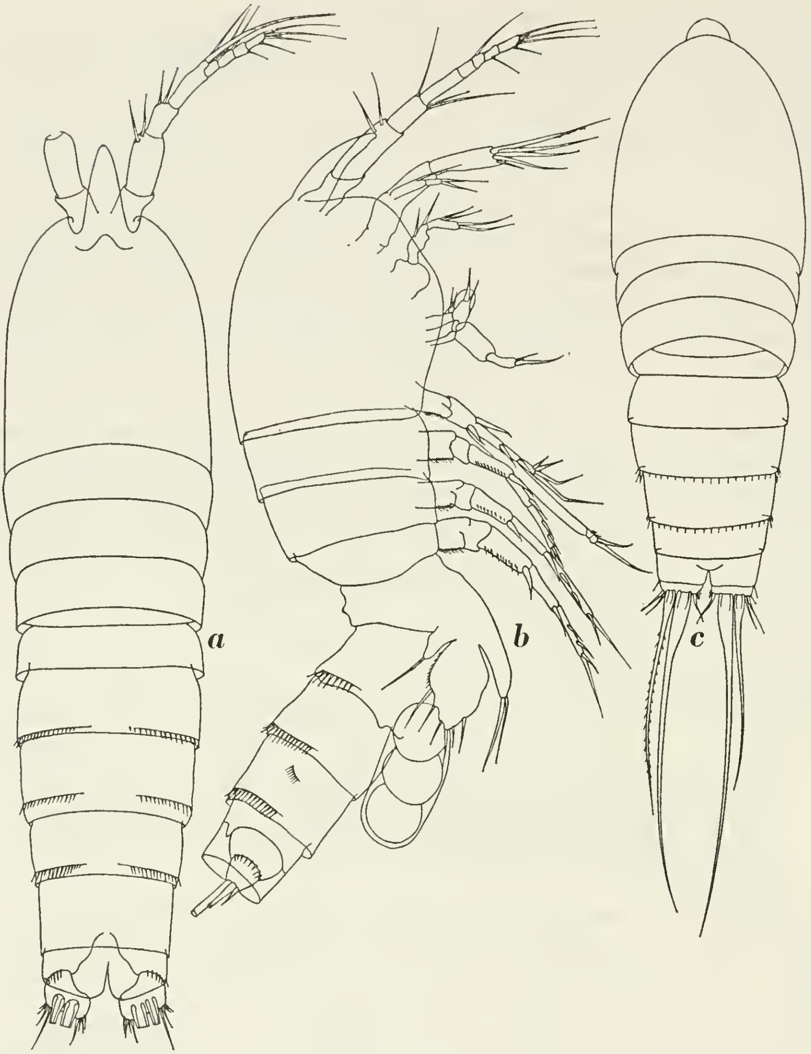

FIGURE 71.—*Amphiascus minutus* (Claus), loc. 591, ad. ♀: *a*, whole animal, dorsal view; *b*, same animal, lateral view from right side; loc. 594, ad. ♀: *c*, whole animal, dorsal view. (× 275.)

(fig. 71*b*). Rostrum long and slender, as long as antennular segments 1 and 2, bluntly pointed, pointing forward and downward, separated from cephalic somite by distinct groove (fig. 72*d*). Thoracic somites 2 and 3 of equal length, epimeral plates cut off squarely. 4th thoracic somite short, nearly as long as 5th thoracic somite.

Fusion between abdominal somites 1 and 2 very incomplete, with distinct dorsal line of fusion, somites of equal length, with dorso-

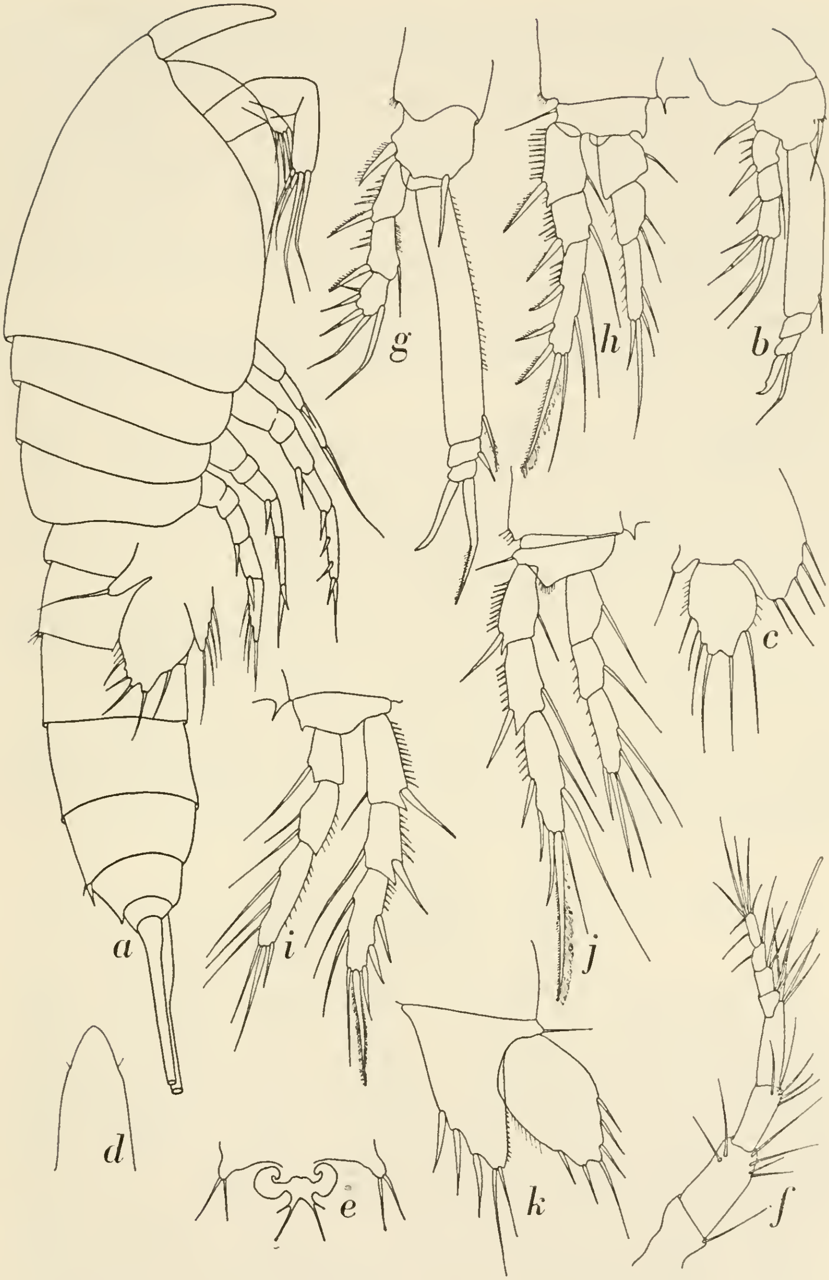

Figure 72.—*Amphiascus minutus* (Claus), loc. 594, ad. ♀: *a*, whole animal, lateral view from right side; *b*, leg 1; *c*, leg 5; loc. 591, ad ♀: *d*, rostrum, dorsal view; *e*, genital somite, ventral view; *f*, antennule; *g*, leg 1; *h*, leg 2; *i*, leg 3; *j*, leg 4; *k*, leg 5. (× 460.)

lateral spinules, 4th nude. 5th thoracic somite in this specimen completely telescoped into 4th, short, with nude anal plate. Furcal rami as long as wide; insertion on 5th abdominal somite marked by spinules. Each ramus with 5 marginal setae and 1 appendicular seta, heavily damaged in this specimen, but 2 and 3 thickened and probably also lengthened. Some scattered spinules occur along internal and external borders. Basal portions of setae not swollen.

Antennules 8-segmented, 1st and 2nd segments thickened, 4th segment fairly long, with small conical process bearing aesthetasc and 2 setae. Setation represented in figure 72*f*.

Antenna with 3-segmented exopodite, bearing 1, 1, and 3 setae, respectively. Allobasis large, with single internal seta at half its length. Endopodite with total of 8 appendages, 4 of which are geniculate.

Mandible and maxillipede as figured by Sars (1906, pl. 96). Mandible with big basopodite; exopodite large, unsegmented, with 3 setae, endopodite much larger, also unsegmented, with total of 7 setae. Claw of maxillipede as long as basis, slightly curved at apex. Internal margin of basis straight, with 2 setae.

Leg 1 (fig. 72*g*) with 3-segmented endopodite and exopodite. Basis with distinct internal and external spine. 1st endopodal segment styliform, longer than whole exopodite, with small seta almost at end of internal margin. Segments 2 and 3 of endopodite small, 3rd with claw and hooked spine. 2nd exopodal segment only slightly longer than 1st, with small internal seta. 3rd exopodal segment small, with a total of 5 setae.

Legs 2 to 4 (figs. 72*h–j*) have the following setal formula:

	endopodite	*exopodite*
leg 2	1.2.121	1.1.223
leg 3	1.2.321	1.1.223
leg 4	1.1.221	1.1.223

Leg 5 (fig. 72*k*) with broadly ovoid exopodite, attached to baso-endopodite with narrow zone, with 6 short, marginal setae. Baso-endopodite covering ⅗ length of exopodite, with 3 internal setae and 2 apical setae. External margin spinulose. Color completely faded, faintly yellowish. The female carries 3 eggs in one sac. This specimen differs from the usual conception of the species by the unusually short 2nd segment of the exopodite of leg 1.

Adult female (loc. 594), total length 0.31 mm.; greatest diameter 0.09 mm.; greatest length of furcal setae 0.18 mm.

This specimen differs from that described above in the following points:

1. Body very strongly contracted and, as a result, much more compactly built (figs. 71*c*, 72*a*).

2. Furcal rami much wider than long, with marginal setae 2 and 3 greatly lengthened and thickened, both also swollen at base, especially seta 2, which has fairly extended swollen part.

3. Exopodite of antenna 3-segmented, but setae number 1, 0, and 3, respectively.

4. 3rd exopodal segment of leg 4 with 3 internal setae.

REMARKS.—*Amphiascus minutus* is distributed throughout the entire Atlantic, from the Arctic seas, along both the American and European coasts, down into Antarctic waters; its distribution has been discussed by Lang (1948, p. 651). The following localities have since been made known: the Öresund strait between Denmark and Sweden (Dahl, 1948); the Helgoland area in Germany (Klie, 1950); the Dalkey area in County Dublin and Lough Ine in County Cork, Ireland (Roe, 1958, 1960); the Plymouth area in England (Fraser, 1936; Marine Biological Association, 1931, 1957); the Whitstable area in County Kent, England (Maghraby and Perkins, 1956); and the Adriatic (Petkovski, 1955b). The species occurs in sand samples, in washings of algae, and in the plankton. The present records seem to represent the first Pacific records of this species; in the Ifaluk collection it occurred in sand samples taken at various intervals from the reef border and in crevices near the reef margin.

Amphiascus hirtus Gurney

FIGURES 73–75

Amphiascus hirtus Gurney, 1927, p. 523, fig. 142.—Monard, 1928a, pp. 371, 384.—Lang, 1934, p. 32, figs. 71, 72.—Nicholls, 1939, p. 263.—Sewell, 1940, pp. 358, 363.—Nicholls, 1941b, pp. 75, 76.—Lang, 1948, p. 654, fig. 264 (no. 2).

MATERIAL.—Loc. 590, 1 ov. ♀, 0.44 mm.; 1 ad. ♂, 0.29 mm.

DESCRIPTION.—The following is based on the above-mentioned specimens; both have been dissected and mounted.

Adult female, total length 0.44 mm.; length of longest furcal seta 0.14 mm.

General shape of body almost as in *Amphiascus minutus;* moderately slender in dorsal aspect, with division between cephalothorax and abdomen indistinctly marked. Greatest diameter of body at end of cephalic somite; anterior portion narrowing and rounded; posteriorly very gradually narrowing. Head and 1st thoracic somite fused, length of cephalic somite slightly exceeds that of thoracic somites 2 to 4 combined. Back, in lateral view, gently curved, continuing in slender rostrum (fig. 73*a*). Rostrum as in *A. minutus*, curved, slender, apex rounded, separated from cephalic somite by shallow groove and as long as antennular segments 1 and 2. Thoracic somites 2 to 4 almost of equal length, epimeral plates moderately developed, cut off squarely. No spinules or hairs on thoracic somites.

Thoracic somite 5 scarcely visible dorsally, but laterally a prominent feature, with several rows of exceedingly fine spinules on sides. Abdominal somites 1 and 2 fused to form genital somite; line of separation distinct on lateral and dorsal surfaces. Abdominal somites 3 and 4 have equal length, each shorter than somite 1 or 2. Somites 1 to 3 finely haired, hairlike spinules more or less arranged in transverse rows. In addition, there is a completely closed row of spinules along the distal edge of abdominal somites 2 to 4. Anal somite shorter than somite 4, anal plate distinct, nude. Insertion of furcal rami bordered by fine spinules.

Furcal rami short, twice as wide as long, structure as in *A. minutus;* setae 2 and 3 are lengthened and thickened but not swollen basally. Some dispersed spinules occur along internal and external furcal borders.

Antennules shorter than length of cephalic somite, 8-segmented; segments 2 and 4 fairly long; setation represented in figure 74*e*. Aestetasc found on conical process of 4th segment, accompanied by 2 fine setae.

Antenna as in *A. minutus;* exopodite 3-segmented, with 1, 1, and 4 setae, respectively.

Oral appendages as in *A. minutus*.

Leg 1 (fig. 74*a*) with single strong spine on basis. 1st endopodal segment much longer than exopodite, 8 times as long as wide. 2nd endopodal segment small; 3rd endopodal segment 3 times as long as wide. Segment 2 of exopodite very slightly lengthened, with small internal seta; segment 3 of exopodite with total of 5 setae.

Legs 2 to 4 as in *A. minutus;* endopodites of legs 2 and 3 only slightly shorter than exopodites (figs. 74*b,d*). Setal formula:

	endopodite	*exopodite*
leg 2	1.2.121	1.1.223
leg 3	1.2.321	1.1.223
leg 4	1.1.221	1.1.323

Leg 5 (fig. 73*b*) with slender exopodite, but since it is figured from an oblique position, its actual shape is more cordate, fastened to the baso-endopodite by means of a narrow strip, consequently narrowing considerably proximally. 6 marginal setae: 3 externally, 1 at apex, and 2 internally; distal part of external border spinulose. Tip of baso-endopodite reaches middle of exopodite; 5 spiniform setae: 3 at internal margin, 2 at apex. External lobe short, with fine seta.

Color completely faded, transparently yellowish. Female carries sac composed of 3 eggs.

Adult male, total length 0.29 mm.

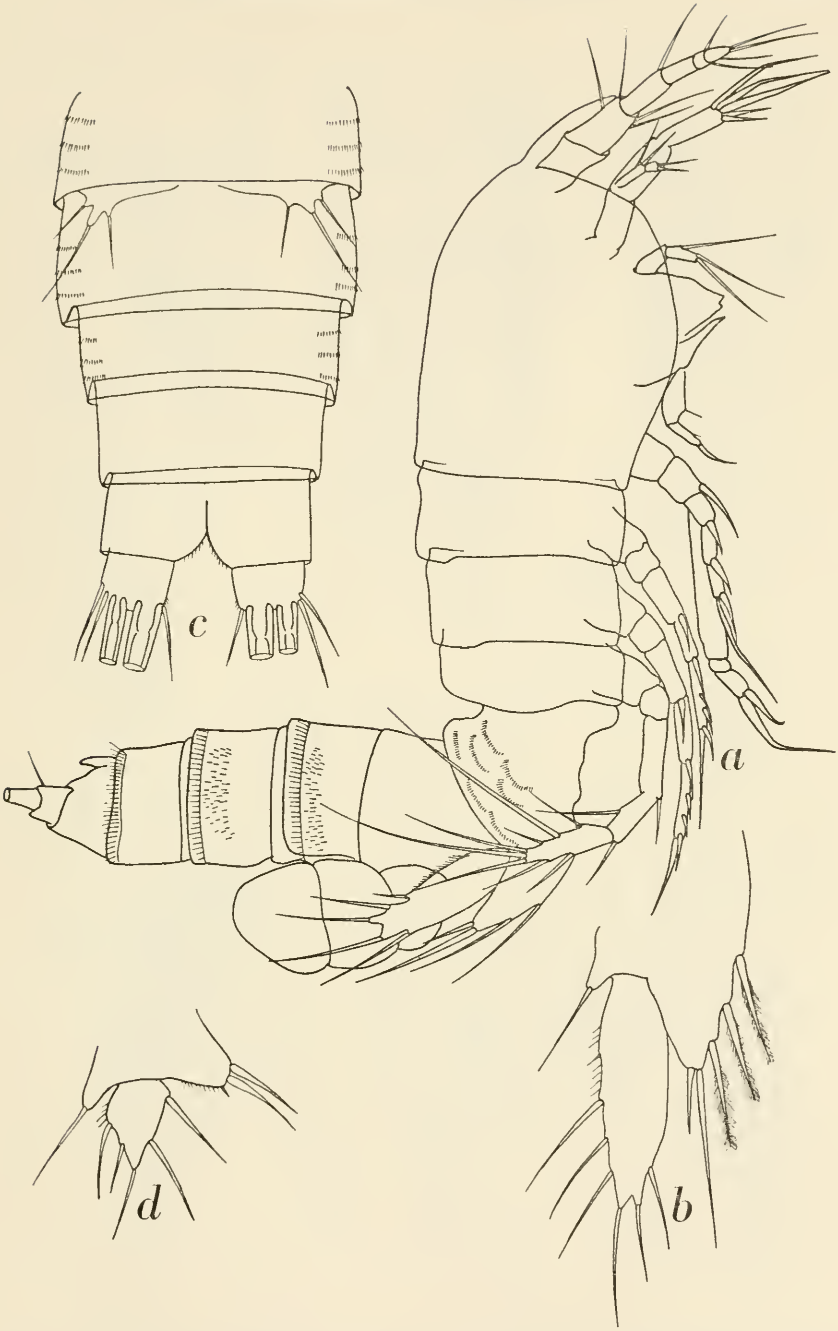

Figure 73.—*Amphiascus hirtus* Gurney, loc. 590, ad, ♀: *a*, whole animal, lateral view from right side; *b*, leg 5; loc. 590, ad. ♂: *c*, abdomen, ventral view; *d*, leg 5. (*a*, × 315; *b–d*, × 520.)

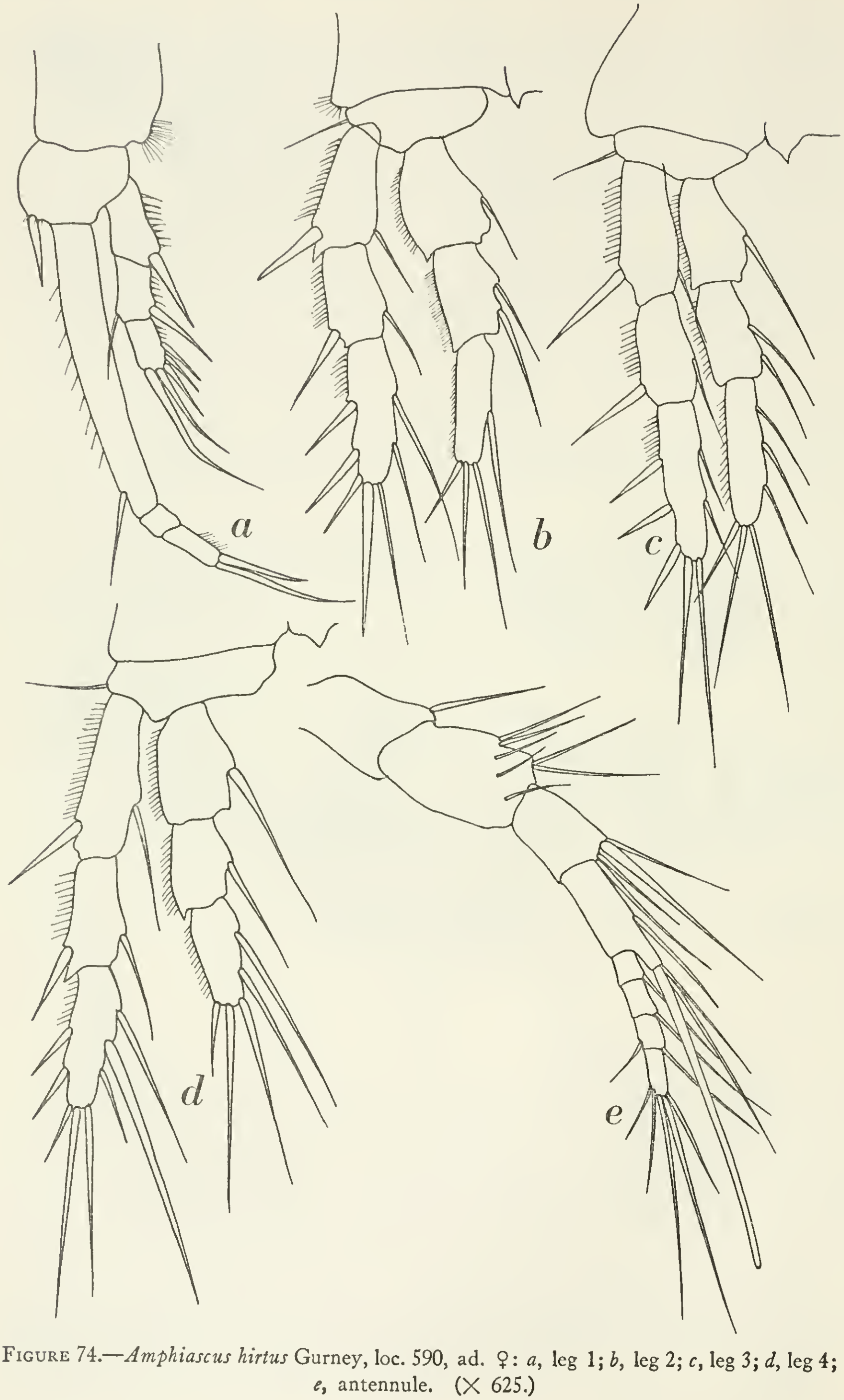

FIGURE 74.—*Amphiascus hirtus* Gurney, loc. 590, ad. ♀: *a*, leg 1; *b*, leg 2; *c*, leg 3; *d*, leg 4; *e*, antennule. (× 625.)

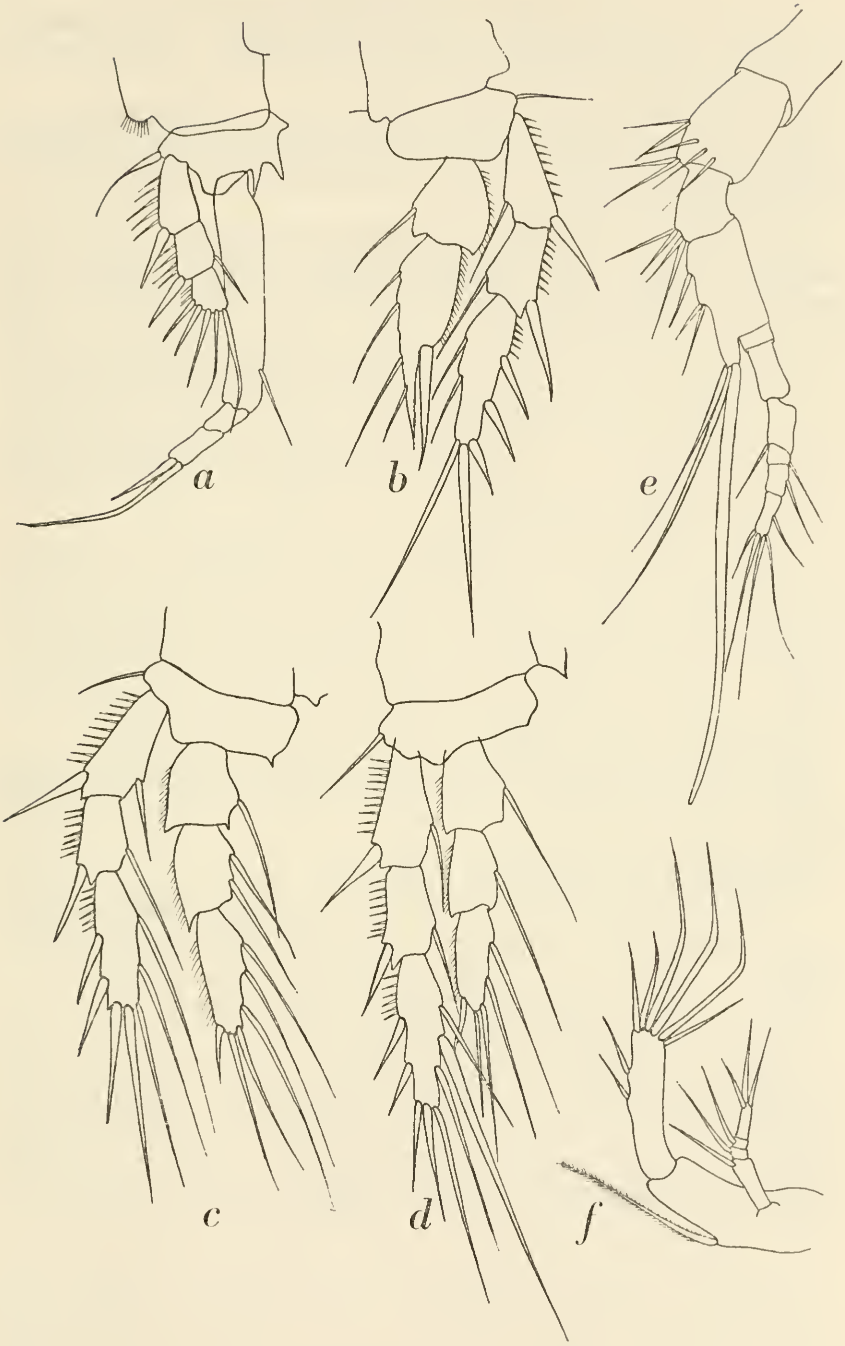

FIGURE 75.—*Amphiascus hirtus* Gurney, loc. 590, ad. ♂: *a*, leg 1; *b*, leg 2; *c*, leg 3; *d*, leg 4; *e*, antennule; *f*, antenna. (× 625.)

Shape of body as in female; consequently, it has not been figured, but it has been dissected to check identification. The principal points of interest are listed below:

1. Abdominal somites 1 and 2 separate. The hairlike spinules on somites 1 to 3 are arranged distinctly in transverse rows; no hairs or spinules occur on somite 4. The rows of spinules on somites 2 to 4 are interrupted ventrally (fig. 73*c*).

2. Antennules apparently 10-segmented. Segment 4 large, indistinctly separated from segment 5, with a conical process and aesthetasc. Jointing developed between 6th and 7th segments. Setation represented in figure 75*e*.

3. Internal spine on basis of leg 1 short and strong, basally with 2 short additional spines (fig. 75*a*).

4. Endopodite of leg 2 modified; the accurate shape can best be taken from figure 75*b*. In the structure of this leg the male approaches that of *A. minutus* very closely.

5. Leg 5 (fig. 73*d*) with small, distinctly cordate exopodite, strongly narrowed proximally and attached to baso-endopodite by means of a narrow strip. There are 5 marginal setae: 2 at external, 2 at internal border, and 1 at apex. Proximal part of external margin spinulose. Baso-endopodite with 2 apical setiform spines of equal length. External margin spinulose; at distal end of this row of spinules there is a short tooth.

6. Armature of genital plates (leg 6) composed of 3 setae.

Remarks.—*Amphiascus hirtus* is very closely allied to *A. minutus* and a careful comparison of both descriptions shows that the only definite points of difference are:

1. Spinosity of the abdomen in *A. hirtus.*
2. Small differences in the shape of leg 5, especially the exopodite.
3. Greater length of antennules and antennular segments in *A. hirtus.*

On the basis of the two characters mentioned under 2 and 3, *A. minutus* shows a considerable variability.

A. hirtus has been recorded so far from Port Said, Qantara, and Port Taufiq in the Suez Canal zone (Gurney, 1927: ♀ 0.51 mm., ♂ 0.45 mm.) and from Campbell Island in the South Pacific (Lang, 1934). The present specimens originate from a sand sample taken some 80 feet from the reef margin at Falarik in the Ifaluk Atoll.

Genus *Amphiascopsis* Gurney, 1927

Amphiascopsis cinctus (Claus, 1866)

FIGURES 76–81

Dactylopus cinctus Claus, 1866, p. 27, pl. 3 (figs. 8–12).
Amphiascus cinctus.—Vàtova, 1928, p. 182.—Nicholls, 1939, p. 261.—Sewell, 1940, pp. 256, 352, 358, 363, 366, 367, 369, 370, 373, 375, 376, figs. 54, 55; 1949, p. 172.
Amphiascopsis cinctus.—Nicholls, 1941b, pp. 71, 73, 75, 76.—Lang, 1944, p. 17.—Dahl, 1948, p. 98.—Lang, 1948, p. 666, fig. 269 (no. 1).—Sewell, 1949, p. 172.—Klie, 1950, p. 80.—Roe, 1958, p. 229; 1960, p. 283.
Amphiascus ceylonicus.—Nicholls, 1939, p. 261; 1941b, pp. 75, 76.
Amphiascus havelocki.—Nicholls, 1939, p. 259.—Sewell, 1940, pp. 127, 285, 358, 363.—Nicholls, 1941b, pp. 75, 77.
Amphiascopsis havelocki.—Krishnaswamy, 1953a, p. 71.
Amphiascus imperator.—Nicholls, 1939, p. 261; 1941b, pp. 75, 76.
Amphiascus lagunaris.—Sewell, 1940, p. 265.
Amphiascopsis lagunaris.—Nicholls, 1941b, p. 77.
Amphiascopsis australis Nicholls, 1941, p. 414, fig. 17; 1941b, pp. 71, 75, 77.—Sewell, 1949, p. 172.

MATERIAL.—Loc. 425, 1 ad. ♀, 0.60 mm. Loc. 431, 1 ov. ♀, 0.65 mm.; 2 ad. ♂♂, 0.54 and 0.59 mm. Loc. 589, 2 ov. ♀♀, 0.62 and 0.66 mm.; 1 ♀ cop. V, 0.53 mm.; 2 ad. ♂♂, 0.54 and 0.60 mm. Loc. 590, 1 ♀ cop. V, 0.48 mm. Loc. 592, 1 ad. ♂, 1.02 mm. Harry Sta. 41, 1 ad. ♀, 0.67 mm.; 1 ad. ♂, 0.68 mm.

DESCRIPTION.—The 0.66-mm.-long ovigerous female from locality 589 and the adult male from locality 592 will be described completely. Some additional information on two slightly aberrant specimens is also presented.

Adult female (loc. 589), 0.66 mm.; greatest diameter 0.18 mm.; longest furcal seta 0.29 mm.; proportional length of cephalothorax and abdomen is 23:21.

Body long and slender, in dorsal aspect walls of cephalic somite almost parallel, very gradually narrowing anteriorly and posteriorly (fig. 77*a*). Separation between cephalothorax and abdomen marked by slight constriction behind 5th thoracic somite. Head and 1st thoracic somite fused to form cephalic somite, slightly longer than combined lengths of thoracic somites 2 to 4. Line of back, in lateral view, smoothly curved into prominent rostrum (fig. 77*b*). Rostrum, in dorsal view, placed in deep depression between insertion of antennules, separated from cephalic somite by shallow groove, curved, pointing forward, reaching halfway 2nd antennular segment. Two fine hairs of frontal organ are very distinctly visible. Laterally cephalic somite is well produced, covering basal parts of oral appendages. Thoracic somites 2 to 4 of equal length, epimeral plates rounded.

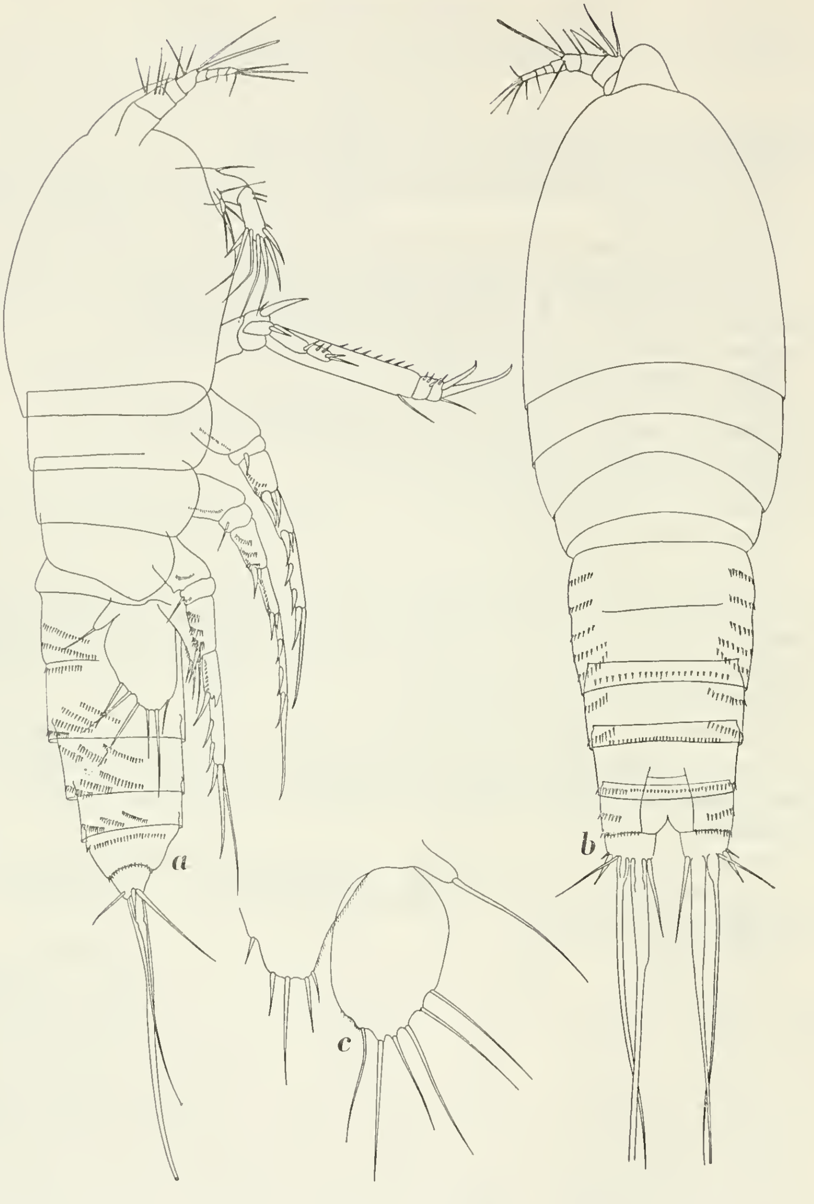

FIGURE 76.—*Amphiascopsis cinctus* (Claus), loc. 425, ad, ♀ : *a*, whole animal, lateral view from right side; *b*, same animal, dorsal view; *c*, leg 5. (*a*, *b*, × 165; *c*, × 275.)

5th thoracic somite distinctly visible in dorsal and lateral view. Abdominal somites 1 and 2 fused to form large genital somite; line of fusion distinct dorsally and laterally. Genital somite not swollen laterally and only slightly shorter than combined lengths of abdominal somites 3 and 4. There are 2 more or less oblique rows of spinules on sides of 1st, 2nd, and 3rd abdominal somites; in addition, there are spinules on the ventral aspects of somites 3 and 4; the position of all spinules appears from figures 77*a*,*b*. Somites 3 and 4 have about the same length. Anal somite short, strongly telescoped into 4th, with broadly rounded anal plate. Insertion of caudal rami bordered with spinules.

Furcal rami broader than long (proportion 3:2), with 5 marginal setae and 1 appendicular seta. Setae 1 and 4 fine and short; seta 5 an acutely pointed spine. Setae 2 and 3 lengthened and thickened, especially 3rd, reaching half length of body. Both setae are setose, seta 3 swollen at base. Appendicular seta fairly long; spiniform seta, inserting in extreme distal end of each ramus.

Antennules ⅔ the length of cephalic somite, 8-segmented. Segment 4 with moderately developed conical process bearing aesthetasc and 2 fine setae. Setation represented in figure 80*a*.

Antenna (fig. 80*b*) with well-developed exopodite, 3-segmented, with 1, 1, and 3 setae respectively; all setae fairly strong. Endopodite carries total of 8 appendages, 3 or which are geniculate setae. Internal endopodal margin spinulose.

Cutting edge of mandibular praecoxa damaged in my preparation, but basipodite well developed, with 3 long setae. Exopodite present, faintly 2-segmented, with 4 setae. Endopodite unsegmented, with total of 7 setae: 2 lateral, 5 terminal (fig. 80*c*).

Arthrite of maxillule (fig. 80*d*) moderately developed, with 9 setiform spines and haired seta. Coxa and basis each with distinct endite, with 2 and 3 setae respectively. Exopodite small, with 2 setae; endopodite unsegmented, with total of 4 setae. No epipodite.

Maxilla (fig. 80*e*) with strongly developed basal endite, carrying strong, curved spine and two setae. Praecoxa and coxa partly fused, with total of 3 endites. Distal 2 endites with 3 spinulose, short setae; remaining (proximal) endite with 4 setae. Endopodite small, unsegmented, with 3 setae.

Maxillipede (fig. 80*f*) with short coxa, carrying 3 (and not 2 as figured by Sars, 1906, pl. 91) setae on distal lobe. Basis with straight internal border, with longitudinal row of fine hairs and seta. External margin moderately swollen. Endopodite unsegmented, forming curved, acutely pointed claw, slightly shorter than basis. 2 additional setae on endopodite.

Leg 1 (fig. 79*a*) with 3-segmented endopodites and exopodites. Basis with spine at internal and external borders. 2nd exopodal segment twice as long as broad and twice as long as segment 1, with strong external spine and fine internal seta. 3rd exopodal segment small, with total of 5 appendages. 1st endopodal segment styliform,

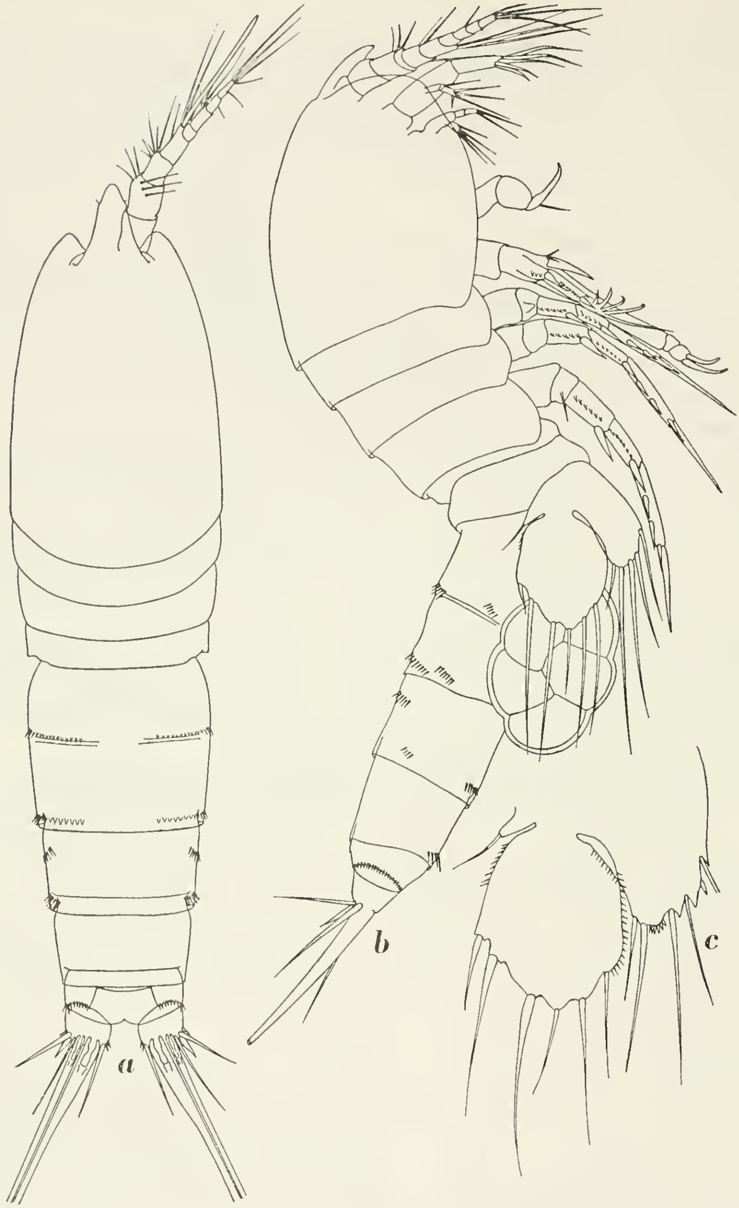

FIGURE 77.—*Amphiascopsis cinctus* (Claus), loc. 589, ad ♀: *a*, whole animal, dorsal view; *b*, same animal, lateral view from right side; *c*, leg 5. (*a*, *b*, × 165; *c*, × 275.)

5 times as long as wide; external margin spinulose, internal margin with fine seta almost at end of internal margin. 2nd and 3rd endopodal segments only slightly differing in length, each with 3 external spines

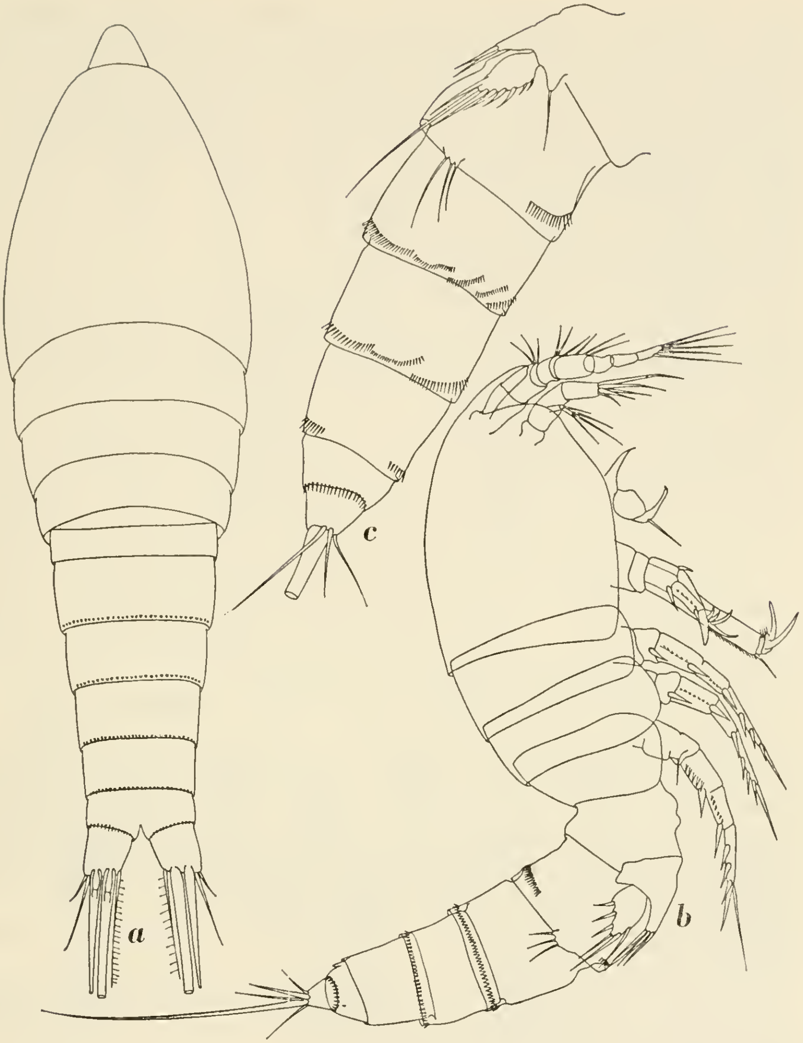

FIGURE 78.—*Amphiascopsis cinctus* (Claus), Harry Sta. 41, ad. ♂: *a*, whole animal, dorsal view; loc. 589, ad. ♂: *b*, whole animal, lateral view from right side; loc. 592, ad. ♂: *c*, abdomen, lateral view from left side. (× 165.)

and an internal seta. In addition, the 3rd segment carries 2 hooked claws of unequal size.

Legs 2 to 4 (figs. 79*b–d*) have the following setal formula:

	endopodite	*exopodite*
leg 2	1.1.121	1.1.223
leg 3	1.2.321	1.1.323
leg 4	1.1.221	1.1.323

Leg 5 (fig. 77*c*) with large, almost circular exopodite, bearing 6 setae, attached to baso-endopodite by means of very narrow strip. 6 marginal setae; size and distribution can best be taken from figure 77*c*; internal and external borders are spinulose. Baso-endopodite reaching halfway along exopodite, with 5 setae and some dispersed spinules.

Color completely faded, greenish yellow. No eye or eyespot visible. Female carries sac with 5 eggs.

Adult male (loc. 592), total length 1.02 mm.; greatest diameter 0.23 mm.; longest furcal seta 0.65 mm.

Body strongly built and slender (figs. 81*a, b*), greatest diameter at end of cephalic somite, very gradually narrowing posteriorly, of same general appearance as female. Rostrum as in female though depression in cephalic somite is not so deep. Separation between cephalothorax and abdomen more indistinct than in female, both parts of body of nearly same length (fig. 81*a*). 1st and 2nd abdominal somites separate; 1st with some dorsolateral spinules; genital plates distinctly visible in lateral aspect, each bearing 3 setae. 2nd abdominal somite with several short rows of spinules, together forming complete zone of spinules on distal part of somite; spinules on 3rd somite more moderately developed. 4th somite with some dorsolateral and ventrolateral spinules only. Anal somite short, insertion of furcal rami bordered by spinules; anal flap nude (fig. 78*c*).

Development of furcal rami and setation as in female, lengthened setae 2 and 3 not swollen at base.

Antennules 8-segmented, subchirocerate, jointing between 5th and 6th segments. Setation represented in figure 80*g*. In Sars' specimen (1906, pl. 92) the antennule appears to have been 9-segmented by the development of an extra jointing in the 7th segment. There are 2 aesthetascs, 1 on segment 3, 1 on cone of segment 4.

No sexual differences were observed between oral parts and 2nd antennae of male and female.

Leg 1 (fig. 79*e*) is almost as in female, but internal spine on basis very big and curved upward, reaching half length of endopodite; spine's base is bordered by spinules.

Details of legs 2 to 4 can be taken from figures 79*f–h;* the setal formula does not differ from that of the female:

	endopodite	*exopodite*
leg 2	1. (modified)	1.1.223
leg 3	1.2.321	1.1.323
leg 4	1.1.221	1.1.323

Endopodite of leg 2 (fig. 79*f*) modified; 1st segment with short internal seta and with strong basal spine. 2nd segment with large, external knife-shaped appendage, internal margin with 2 appendages and long, plumose seta. In addition, there are 2 fine setae at the internal margin of the segment.

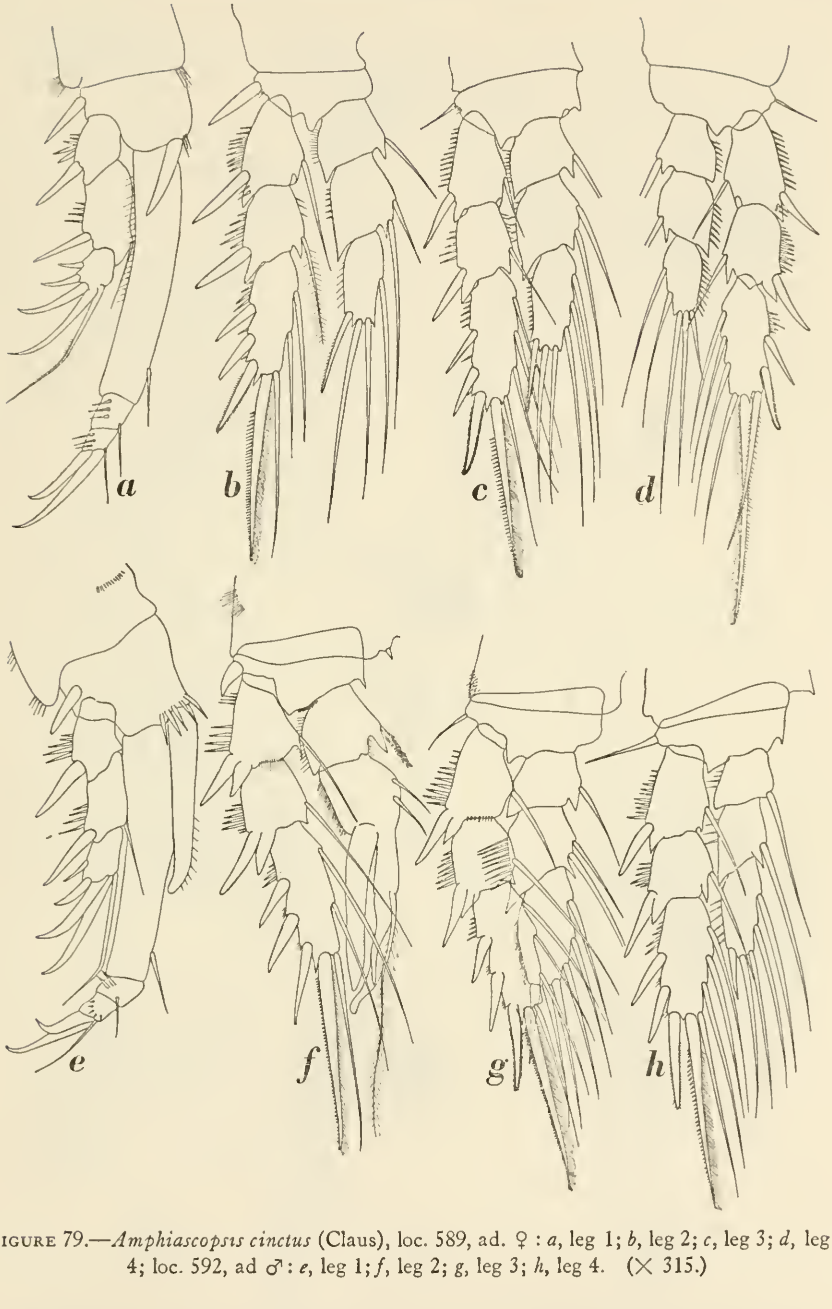

Figure 79.—*Amphiascopsis cinctus* (Claus), loc. 589, ad. ♀ : *a*, leg 1; *b*, leg 2; *c*, leg 3; *d*, leg 4; loc. 592, ad ♂ : *e*, leg 1; *f*, leg 2; *g*, leg 3; *h*, leg 4. (× 315.)

Exopodite of leg 5 (fig. 81*d*) more or less cordate, slightly longer than wide (proportion 3:2), with total of 6 setae. Baso-endopodite reaching half length of exopodite, with 2 apical setae. In addition,

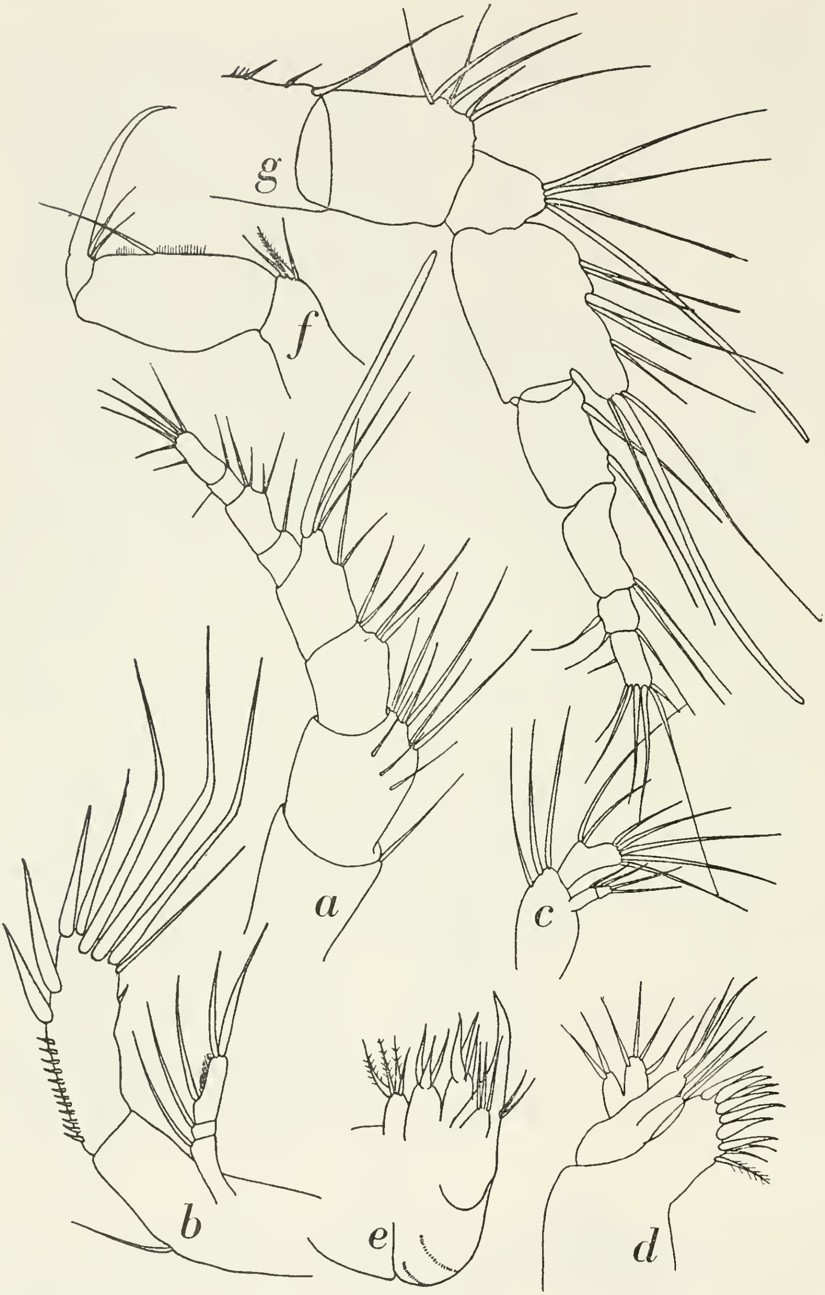

Figure 80.—*Amphiascopsis cinctus* (Claus), loc. 589, ad. ♀: *a*, antennule; *b*, antenna; *c*, mandibular palp; *d*, maxillule; *e*, maxilla; *f*, maxillipede; loc. 592, ad. ♂: *g*, antennule. (× 520.)

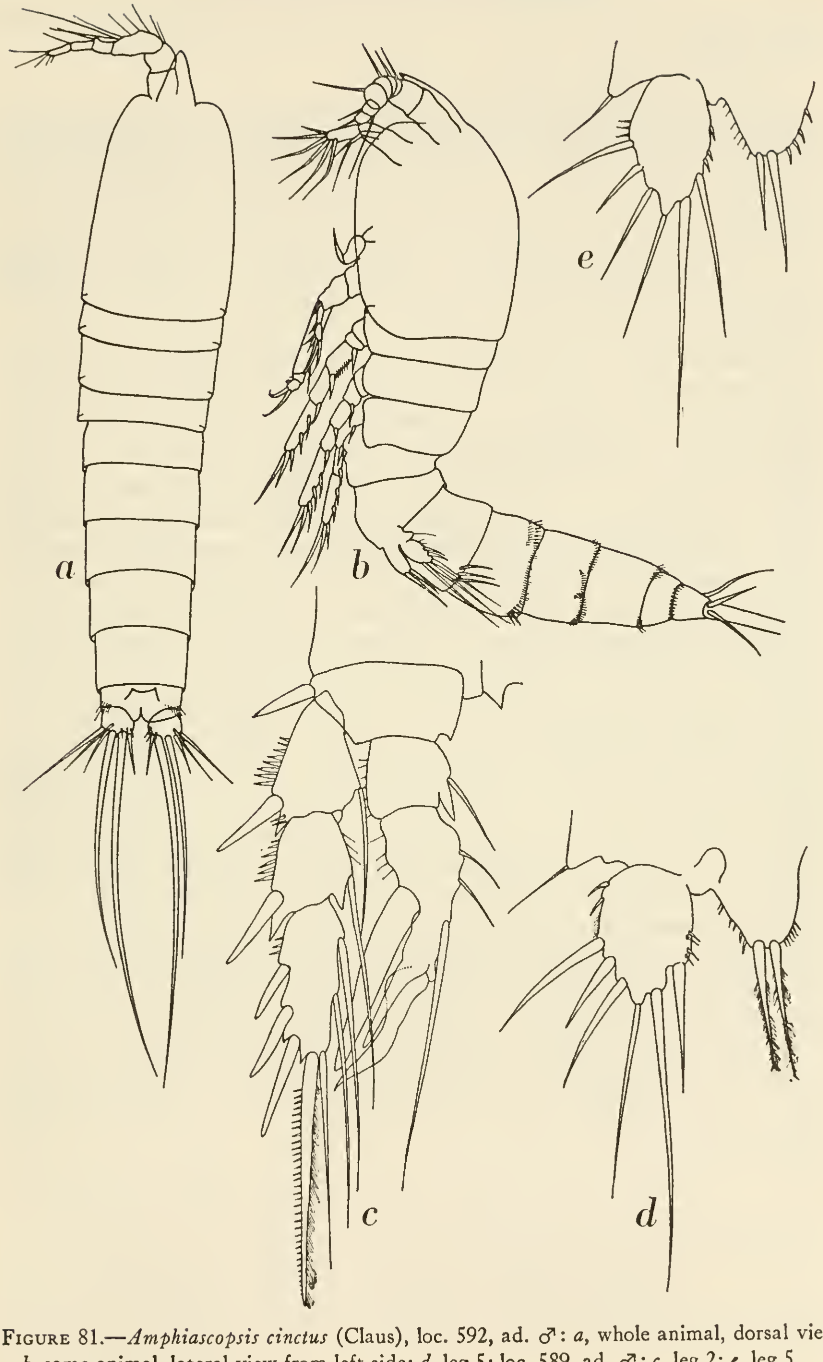

FIGURE 81.—*Amphiascopsis cinctus* (Claus), loc. 592, ad. ♂: *a*, whole animal, dorsal view; *b*, same animal, lateral view from left side; *d*, leg 5; loc. 589, ad. ♂: *c*, leg 2; *e*, leg 5. (*a b*, × 100; *c–e*, × 460.)

there are some dispersed small spines on exopodite and baso-endopodite.

Color, as in female, faded.

A female from locality 425, total length 0.60 mm., greatest diameter 0.20 mm., is remarkable by the extreme spinulosity of the legs and the abdomen. The 1st exopodal segment of legs 2 to 4 has several coronulae of strong spinules; the arrangement of the many spinules on the abdomen can best be judged from figures 76*a*,*b*. Setae 2 and 3 of furca, which are greatly lengthened, are also swollen at the base, especially the 2nd seta, where the swollen part is fairly long. The 5th leg does not differ in any respect from the type described above (fig. 76*c*).

A male specimen from locality 589, total length 0.60 mm., greatest diameter 0.14 mm., has poorly developed spinules on legs and abdomen. On the exopodite of legs 2–4 the spinules are restricted to the external margin. On the abdominal somites spinules occur on somite 1 on dorsolateral walls, on somites 2 and 3 as completely closed row along distal border and on somite 5 along insertion of furca (figs. 78*b*, 81*c*,*e*).

REMARKS.—The geographical distribution of *Amphiascopsis cinctus* has been discussed by Lang (1948, p. 667). To the localities cited in his paper the following can be added: Öresund Strait between Denmark and Sweden (Dahl, 1948); the Helgoland area of Germany (Klie, 1950); the Dalkey area of County Dublin and Lough Ine of County Cork, Ireland (Roe, 1958, 1960); and the Rovinj, Yugoslavia, area on the Adriatic (Vàtova, 1928). Pacific records are rather scarce: in weed washings from Nancowry Harbour in the Nicobar Islands (Sewell, 1940: ♀ 0.97 mm., ♂ 0.66 mm.); Kundugal Channel off the Madras coast (Krishnaswamy, 1953a: ♀ 0.945 mm., as *Amphiascopsis havelocki*); the pearl oyster banks off Ceylon (Thompson and A. Scott, 1903: ♀ 1–1.3 mm., ♂ 0.96 mm., as *Dactylopusia ceylonica* and *D. havelocki*); in washings of invertebrates from 1595 m. and 13 m. depth between Lucipara and Penju Islands in the eastern part of the Malay Archipelago, and off the Aru Islands (A. Scott, 1909); and Lyttelton Harbor in New Zealand (Brady, 1899; as *Dactylopus hanseni*).

In the Ifaluk collection the species occurs both in washings of algae and in sand samples; it forms a characteristic and fairly common element of the reef fauna.

Genus *Metamphiascopsis* Lang, 1944

Metamphiascopsis hirsutus (Thompson and A. Scott, 1903)

FIGURES 82–86

Dactylophusia hirsuta Thompson and A. Scott, 1903, p. 269, pl. 9 (figs. 19–24).
Amphiascus hirsutus.—Nicholls, 1939, p. 262.—Sewell, 1940, pp. 126, 247, 358, 363, 375, figs. 50, 51.
Amphiascopsis hirsutus.—Nicholls, 1941b, pp. 75, 77; 1942a, p. 136; 1945, p. 5.—Krishnaswamy, 1953a, p. 70.
Metamphiascopsis hirsutus.—Lang, 1944, p. 19; 1948, p. 683, fig. 275 (no. 1).
Dactylopus maldivensis Wolfenden, 1905, p. 1031, pl. 99 (figs. 34–41).

MATERIAL.—Loc. 81–A–3–d, 1 ♀ cop. stage V, 0.83 mm. Loc. 592, 1 ad. ♂, 0.86 mm.

DESCRIPTION.—Both specimens mentioned above will be described; they have been dissected and mounted.

Female, copepodite stage V, total length 0.83 mm.; proportional length of cephalothorax and abdomen is 7:4.

Body moderately slender, greatest diameter at end of cephalic somite, narrowing anteriorly and posteriorly, with indistinct separation of cephalothorax and abdomen. Head and 1st thoracic somite fused to form cephalic somite, which is longer than combined lengths of thoracic somites 2 to 4. Back, in lateral aspect, smoothly curved, curve continuing in the rostrum (fig. 85). Rostrum big, a triangular plate in front of cephalic somite, downwardly curved, separated from head by shallow groove, length equal to combined lengths of antennular segments 1 and 2. Lateral parts of cephalic somite well produced to shield oral appendages, posterolateral corner slightly produced. Thoracic somites 2 to 4 of equal length, epimeral plates rounded and slightly produced laterocaudally.

5th thoracic somite a narrow ring, visible in both dorsal and lateral aspects. Abdomen incompletely developed, 4-segmented, 4th and 5th somites fused. Genital somite well developed, as long as 2nd abdominal somite, with 2 rows of spinules on distal part of laterodorsal wall. 2nd and 3rd somites with completely closed row of spinules along distal ends. Fused 4th and 5th somites fairly long, line of separation weakly indicated, with row of spinules on ventral wall near that line of fusion. Insertion of caudal rami on anal somite fringed with spinules. Furca as in adult male, to be described below.

Antennules 9-segmented; setation represented in figure 86*a*. In its development the antennule has reached its final stage.

Antenna and mouth parts both in development and setation as in the adult stage, and therefore not described in detail here.

Leg 1 (fig. 86*b*) as in the adult stage, without difference in setation.

Legs 2 to 4 as in the adult female stage; the setal formula is:

	endopodite	*exopodite*
leg 2	1.1.121	1.1.223
leg 3	1.2.321	1.1.323
leg 4	1.1.221	1.1.323

5th legs with setation and shape of adult female stage, but without rows of fine spinules that are found on posterior and anterior aspect. Separation between baso-endopodite and exopodite incomplete, but future line of articulation already indicated. Development of spinules can best be judged from figure 86*c*. 2 setae on small lobe at end of each side of 1st abdominal somite, representing armature of genital plates. In spite of these setae, which suggest the condition in the adult male, I think this specimen is an immature female because of the structure of antennules and endopodite of leg 2 (fig. 86*d*).

Adult male, total length 0.86 mm.; greatest diameter 0.24 mm.; length of longest furcal seta 0.67 mm.

General shape of body moderately slender, especially in dorsal aspect, where greatest diameter is at 2nd thoracic somite (fig. 82*a*). Anterior part of body narrowing and more or less conical; posterior parts also narrowing, with separation between cephalothorax and abdomen indistinct. Back, in lateral view, curved; head separated from rostrum by shallow groove (fig. 82*b*). Rostrum heavy, triangular, curving downward and forward, a very prominent feature in dorsal aspect, as long as first two antennular segments; apex rounded.

Head and 1st thoracic somite fused to form cephalic somite, in length equal to combined lengths of thoracic somites 2 to 4. Laterally the cephalic somite is moderately produced to cover basal parts of oral appendages; posterolateral corner backwardly produced. Epimeral plates of thoracic somites 2 to 4 rounded, slightly backwardly produced.

5th thoracic somite small, visible both in lateral and dorsal aspects. Genital (1st abdominal) somite large, slightly broader than long, about 1½ times length of 2nd or 3rd abdominal somites, which have same length. 4th abdominal somite short, as long as anal somite. All abdominal somites are strongly set with spinules; in addition to a completely closed row of spinules at the distal end of each somite there are oblique rows on the sides, the position of which appears clearly from figure 82*b*. Anal somite with bluntly pointed anal operculum and lateral row of spinules; in addition, spinules border insertion of furca on anal somite.

Furcal rami slightly broader than long (proportion 5:4). 5 marginal setae and 1 appendicular seta on each ramus. Moreover, each ramus has a strong spine placed between setae 4 and 5, and some dispersed spinules along the internal border. Appendicular seta

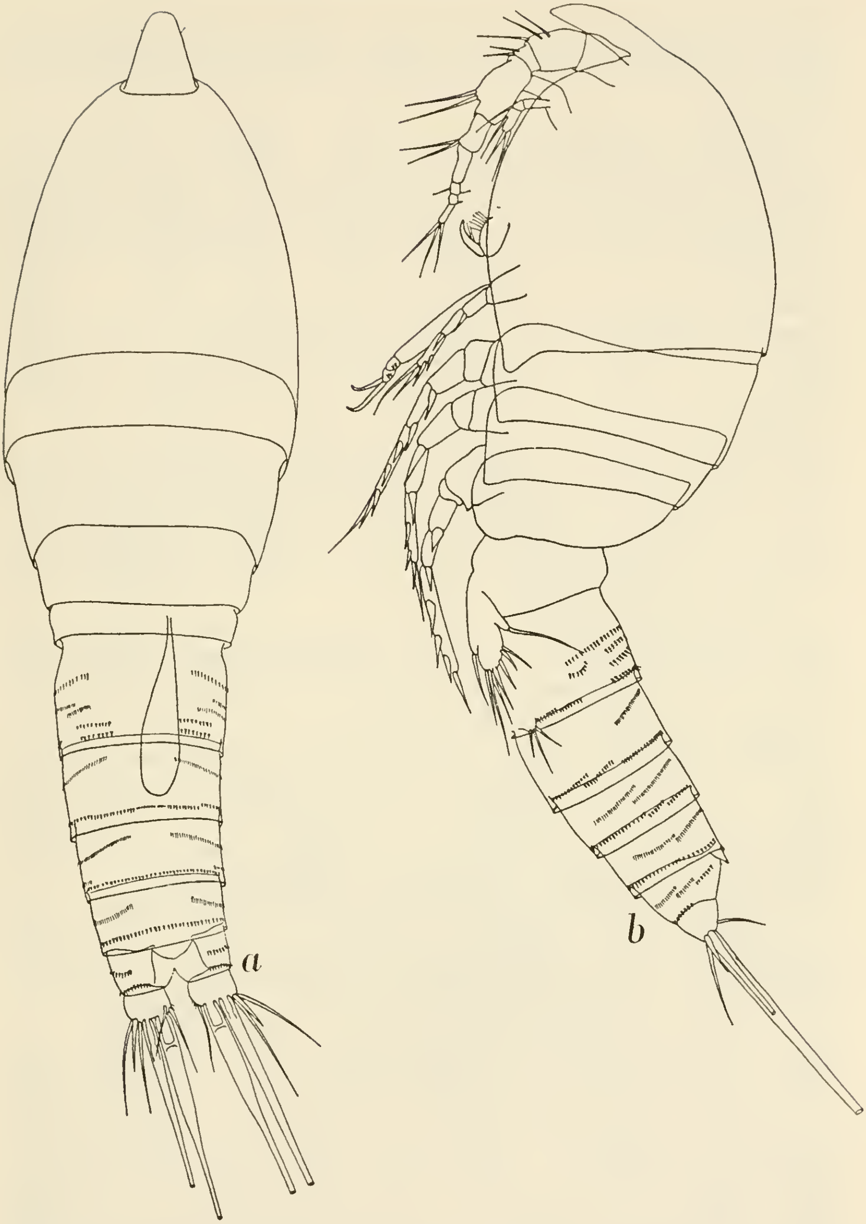

Figure 82.—*Metamphiascopsis hirsutus* (Thompson and A. Scott), loc. 592, ad. ♂: *a*, whole animal, dorsal view; *b*, same animal, lateral view. (× 145.)

and setae 1, 4, and 5 fine; setae 2 and 3 strong and lengthened, especially 2nd, which reaches body length. Both 2nd and 3rd setae are swollen basally; in 2nd seta the swollen part is very prominent and lengthened.

Antennules (fig. 83*a*) subchirocerate, 9-segmented, with hinge between 5th and 6th segments. Segment 4 swollen, big, with strong cylindrical process, bearing aesthetasc and 2 setae; another aesthetasc on segment 3. Segments 7 to 9 small. Setation represented in figure 83*a*.

Antenna (fig. 83*b*) with allobasis, bearing internal seta, and 3-segmented exopodite, with 0 and 4 setae respectively. Endopodite large, with 7 setiform spines, 4 of which are geniculate, and some spinules.

Mandible (fig. 83*c*) with strongly developed praecoxa; 5 teeth at cutting edge strongly chitinized; in addition there is a basal seta. Palp well developed, basipodite with 3 marginal setae. Endopodite well developed, 2-segmented, bearing 1 and 4 setae respectively. Exopodite small, jointing indistinct, with strongly spinulose basal seta and 3 apical setae.

Maxillule (fig. 83*d*) with well-developed praecoxal arthrite, carrying 8 spiniform setae. Coxa and basis with distinct endite, each with 3 setae. Endopodite small, fused to basipodite, with 4 setae. Exopodite present, small, with 2 setae.

Maxilla (fig. 84*d*) with 2 praecoxal and 2 basal endites, each with 2 setae. Basal endite slightly stronger developed, with large, curved spine, contiguous with endite. In addition there are 2 setae near insertion of big spine on basal endite, and 1 on basal part of endite. Endopodite represented by a small lobe bearing 4 setae.

Maxillipede (fig. 83*d*) chelate, basis only slightly swollen, with row of spiniform hairs and 2 setae along internal margin. Endopodite unsegmented, forming curved claw, as long as basis, tapering into fine, curved point; endopodite carries two setae near base.

Leg 1 (fig. 84*a*) with spinulose trabecle at external border of coxa. Basis with strong, curved external marginal spine, at internal border with protruding lamella, at base of which there is a spine. Insertion of endopodite on basis bordered with spinules. Endopodite and exopodite 3-segmented. 2nd exopodal segment elongate, twice as long as broad and longer than 1st exopodal segment, with internal seta. Both segments with external marginal spine and marginal spinules. 3rd exopodal segment small, with total of 5 appendages. 1st endopodal segment 6 times as long as broad, twice as long as whole exopodite, internal margin spinulose and with subapical seta. 2nd and 3rd endopodal segments very small, 3rd with 2 strong, dagger-shaped spines of unequal size and a small seta.

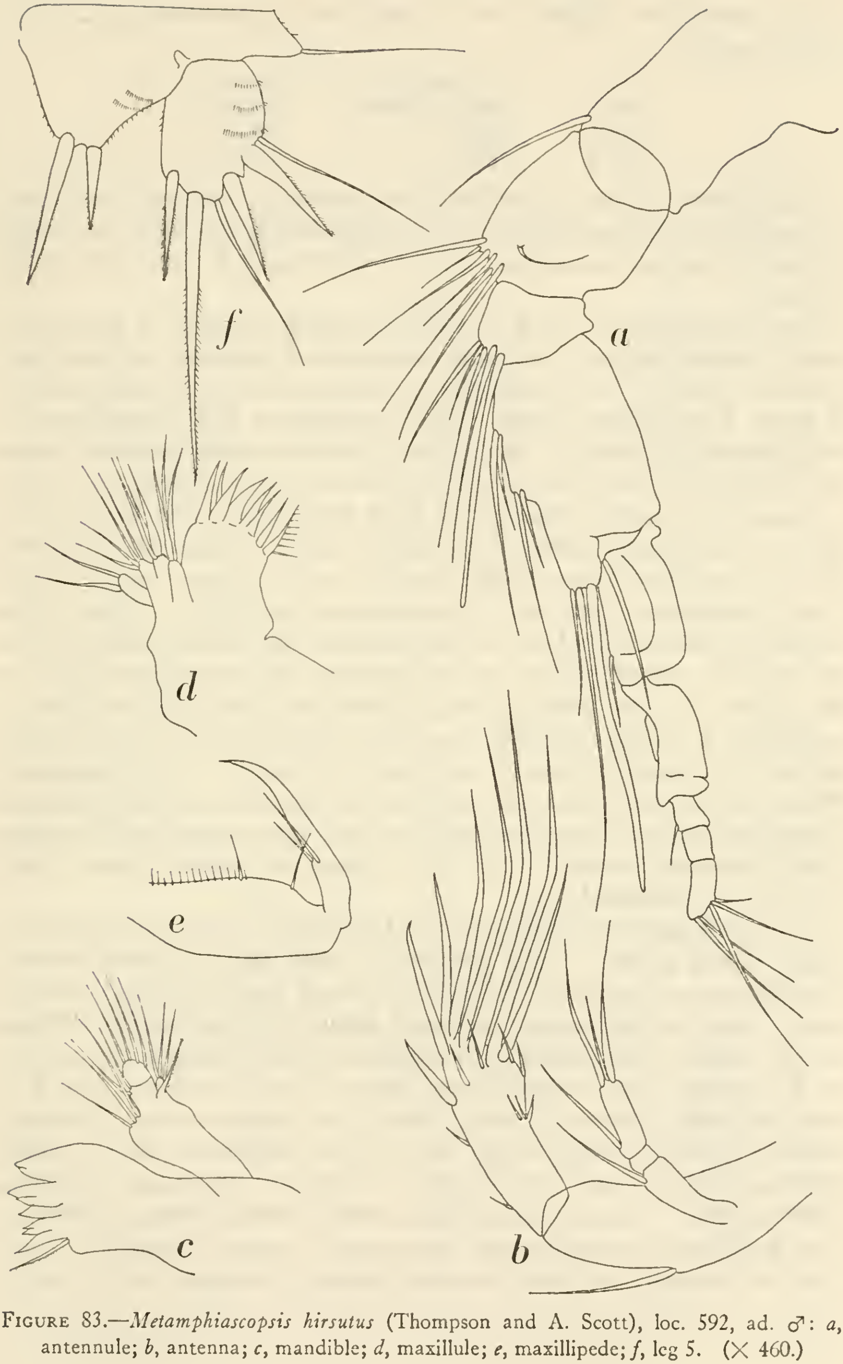

FIGURE 83.—*Metamphiascopsis hirsutus* (Thompson and A. Scott), loc. 592, ad. ♂: *a*, antennule; *b*, antenna; *c*, mandible; *d*, maxillule; *e*, maxillipede; *f*, leg 5. (× 460.)

The particulars of legs 2 to 4 appear from figures 84*b*,*c*,*e*,*f* and the setal formula:

	endopodite	*exopodite*
leg 2	1.222 (modified)	1.1.223
leg 3	1.2.321	1.1.323
leg 4	1.1.221	1.1.323

Endopodite of leg 2 modified; the structure appears best from figures 84*b*,*c*. External margin has 2 articulating spines, apex a strongly spinulose seta and a normal seta, internal margin 2 setae of unequal length.

Baso-endopodite of leg 5 (fig. 83*f*) reaching ⅔ length of exopodite, with 2 strong spines, 2 rows of spinules and spinulose internal and external borders. Exopodite slightly longer than wide, with total of 6 setae, 2 of which are fine. The development and distribution of setae appear in figure 83*f*. In addition, there are some transverse rows of spinules near the external margin; the internal margin is spinulose.

REMARKS.—In the structure of leg 2 this male approaches *Metamphiascopsis hirsutus hirsutus* (Thompson and A. Scott, 1903) and not *M. h. bermudae* (Willey, 1930), but it should be borne in mind that the differences between both subspecies are very slight. *Metamphiascopsis* is differentiated from *Amphiascopsis* by the structure of the mandibular exopodite and by differences in the structure of leg 2 in the male. In the male specimen described here, the mandibular exopodite is set off distinctly from the basipodite, but in the female, at least, it should be greatly reduced and fused with the basipodite. There can be no doubt, however, of the identity of the specimens described above; a closer study of the characters separating the genera *Amphiascopsis* Gurney, 1927, and *Metamphiascopsis* Lang, 1944, seems to be indicated.

The geographical distribution of *M. hirsutus* has been discussed by Lang (1948, p. 685). The species has been recorded from several Mediterranean localities. It has been found also in the Indo-Pacific area, where its distribution includes: Addu Atoll and other localities in the Maldive Archipelago (Wolfenden, 1905, recording the species as *Dactylopus maldivensis*; Sewell, 1940); Henry Lawrence Island in the Andaman Islands (Sewell, 1940); the Madras coast (Krishnaswamy, 1953a); Island Jedan in the Aru Islands (A. Scott, 1909); Rottnest Island and Port Denison in Western Australia (Nicholls, 1942a, 1945). The species has been obtained from both weed washings and washings of invertebrates; moreover, it occurs in plankton samples, particularly in those obtained during the night, and in sand

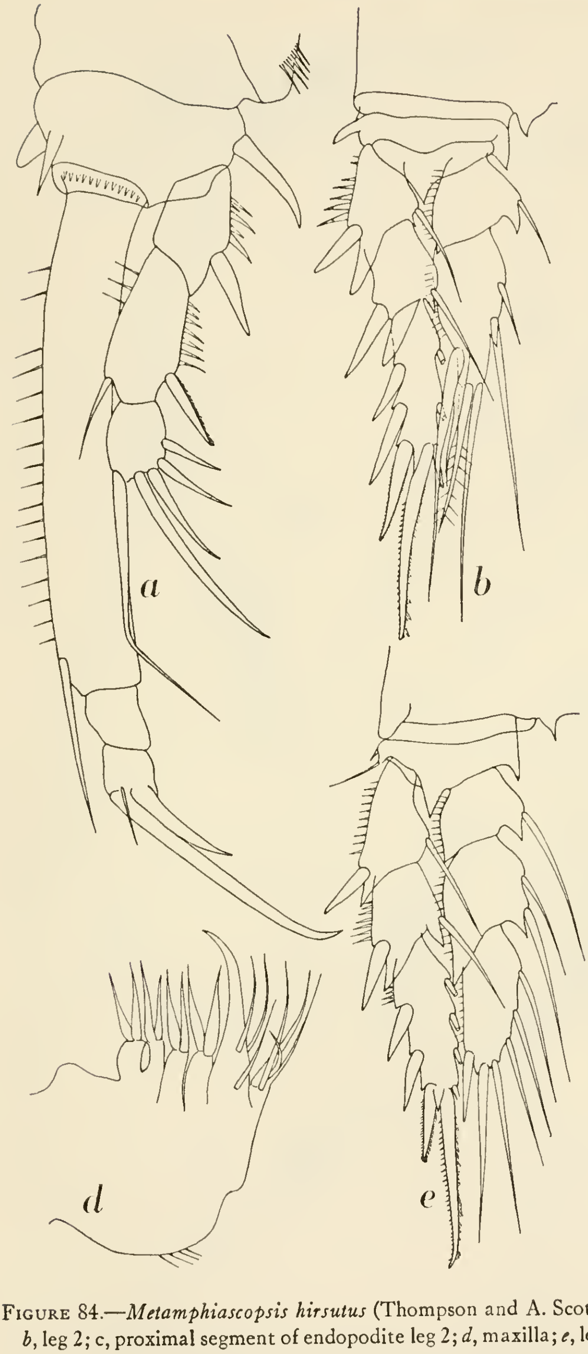

Figure 84.—*Metamphiascopsis hirsutus* (Thompson and A. Scott), loc. 592, ad. ♂: *a*, leg 1; *b*, leg 2; c, proximal segment of endopodite leg 2; *d*, maxilla; *e*, leg 3; *f*, leg 4. (*a*, *c*, *d*, × 460; *b*, *e*, *f*, × 275.)

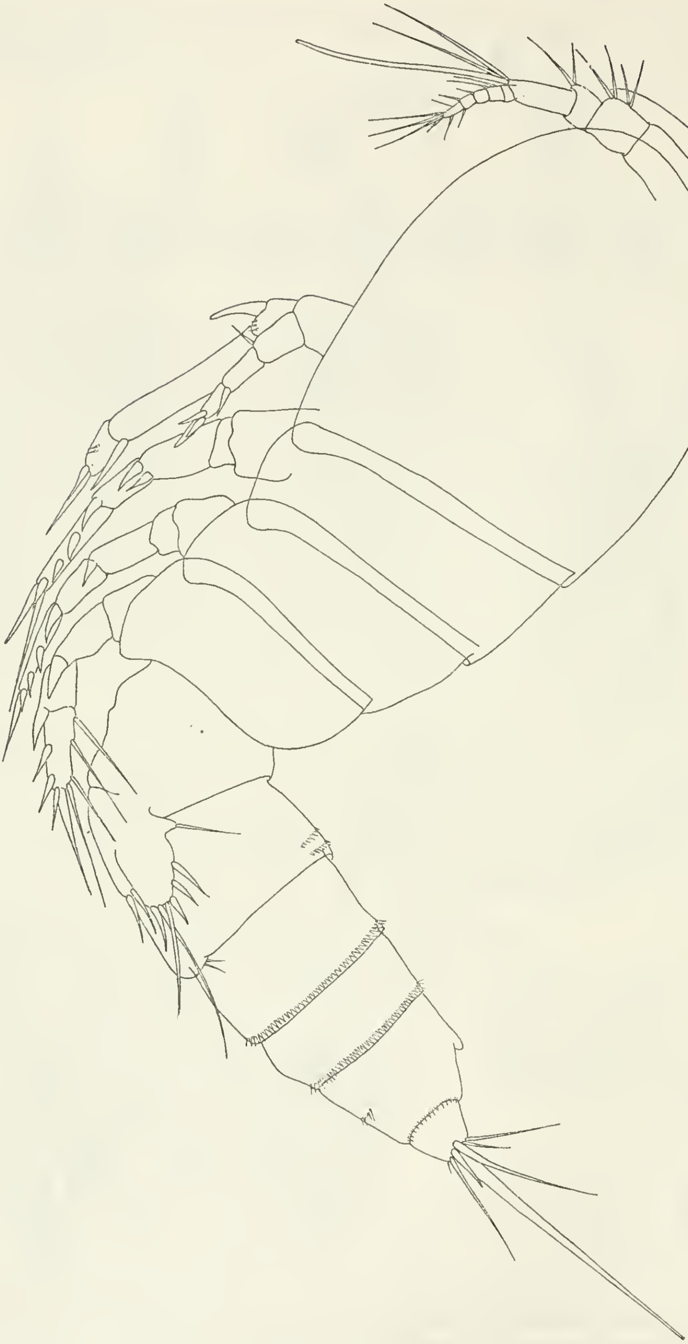

Figure 85.—*Metamphiascopsis hirsutus* (Thompson and A. Scott), loc. 81–A–3–d, ♀ cop. st. V: whole animal, lateral view from left side. (× 165.)

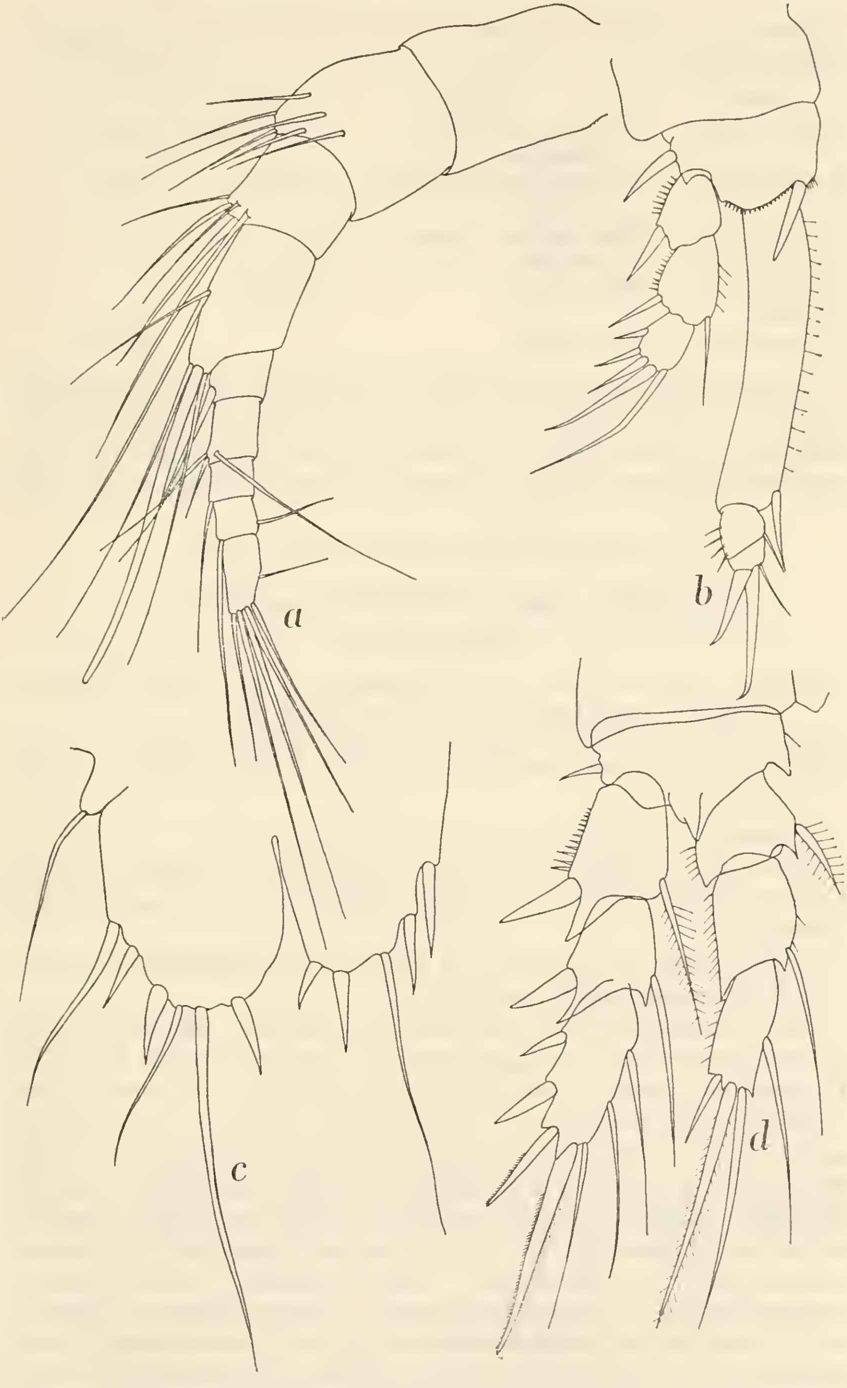

FIGURE 86.—*Metamphiascopsis hirsutus* (Thompson and A. Scott), loc. 81–A–3–d, ♀ cop. st. V: *a*, antennule; *b*, leg 1; *c*, leg 5; *d*, leg 2. (*a*, *c*, × 460; *b*, *d*, × 275.)

samples. The following table shows the size of the specimens recorded so far.

author	*locality*	*female*	*male*
Sewell, 1940	Andaman and Maldive Archipelago	1.20–1.27 mm.	0.82–0.90 mm.
Nicholls, 1942a	Rottnest Island, Western Australia	1.25–1.40 mm.	1.17 mm.
Nicholls, 1945	Port Denison, Western Australia	1.0–1.3 mm.	
Krishnaswamy, 1953a	Madras coast	1.25 mm.	
Present record	Ifaluk Atoll		0.86 mm.

In the Ifaluk collection the species occurs in a washing of the alga *Lyngbya* from the lagoon shelf at a depth of about 6 feet and in a sand sample collected some 340 feet from the reef margin, where the sand was collected from sand pockets between boulders of the élang.

Genus *Robertgurneya* Lang, 1944

Robertgurneya spinulosa (G. O. Sars, 1911)

Figures 87*a–c*, 88

Amphiascus spinulosus Sars, 1911, p. 388, suppl. pl. 22.—Monard, 1928a, pp. 379, 386.—Nicholls, 1939, p. 262.—Sewell, 1940, p. 280.
Amphiascoides spinulosus.—Nicholls, 1941b, pp. 72, 81, 83.
Robertgurneya spinulosa.—Lang, 1944, p. 21; 1948, p. 702, figs. 276 (no. 7), 283 (no. 1).

Material.—Loc. 592, 2 ad. ♀♀, 0.50 and 0.51 mm.

Description.—One of the female specimens from locality 592 has been completely described; this specimen has been dissected and mounted.

Adult female, total length 0.51 mm.; greatest diameter 0.13 mm.; length of longest furcal seta 0.32 mm.

Body moderately slender in dorsal view, greatest diameter at level of oral appendages, very gradually tapering posteriorly (fig. 87*a*). Cephalothorax and abdomen of nearly same length, without distinct separation between these two body regions. Head and 1st thoracic somite fused; cephalic somite longer than combined lengths of thoracic somites 2 to 4. In lateral aspect (fig. 87*b*) back only slightly curved, laterally produced to cover basal parts of oral appendages, posterolateral corner rounded. Rostrum a slender, triangular plate placed in depression of cephalothorax. Rostrum slightly curved, pointing forward, as long as antennular somite 1 and 2. Thoracic somites 2 and 3 with slightly produced epimeral plates, cut off squarely; 4th thoracic somite rounded laterally. All thoracic somites with smooth borders.

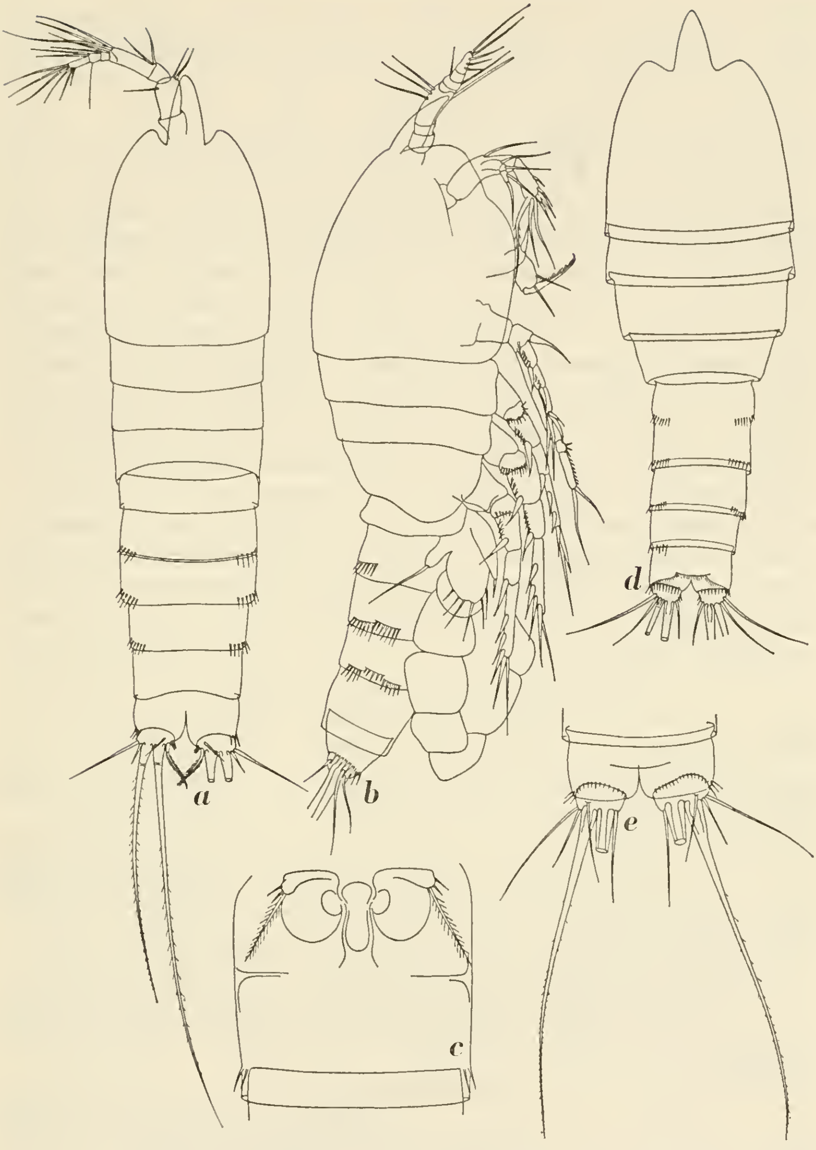

FIGURE 87.—*Robertgurneya spinulosa* (G. O. Sars), loc. 592, ad. ♀ : *a*, whole animal, dorsal view; *b*, same animal, lateral view from right side; *c*, genital somite, ventral aspect. *Robertgurneya rostrata* (Gurney), loc. 592, ad. ♀ : *d*, whole animal, dorsal view; loc. 592, ad. ♂ : *e*, anal somite and furca, dorsal view. (*a*, *b*, *d*, × 165; *c*, *e*, × 275.)

5th thoracic somite small, visible both in lateral and dorsal aspects. Genital somite composed of fused abdominal somites 1 and 2, line of fusion distinct dorsally and laterally, marked by row of spinules on laterodorsal parts of 1st somite; 2nd somite also with laterodorsal spinules. 3rd and 4th abdominal somites of equal lengths; 3rd with lateral spinules near distal end of somite; 4th without spinules. Abdominal somites, in my specimen, fairly strongly telescoped, especially anal somite. Anal somite as long as somite 4, deeply incised between insertion of furca; insertion bordered with spinules. Anal operculum invisible, apparently telescoped into 4th somite. Furcal rami twice as broad as long, with 5 marginal setae and 1 appendicular seta each: appendicular seta fine, scarcely visible; seta 1 fine, short and plumose; setae 2 and 3 lengthened and thickened, setose, 2nd reaching end of abdomen, 3rd half that length; seta 4 small and spiniform; seta 5 fairly long and straight, pointing laterally.

Antennules 8-segmented, 4th segment long (3½ times as long as wide), with small, elongated tubercle, bearing aesthetasc and 2 setae. Segments 5–8 small; setation of antennule represented in figure 88*a*.

Antenna (fig. 88*b*) with distinct, 3-segmented exopodite, with 1, 1, and 3 setae respectively. Allobasis with internal seta, endopodite with total of 7 setae, one of which is particularly strong and spinulose.

Praecoxa of mandible well developed, with 7 strong teeth and seta at cutting edge. Palp with big basipodite, bearing 3 setae, and 2-segmented endopodite, bearing 2 and 5 setae respectively. No trace of exopodite (fig. 88*c*).

Maxillule with well-developed arthrite, bearing 7 strong, spiniform teeth. Apparently only 1 endite (coxal or basal), with 2 setae. Endopodite styliform, fused to basipodite, position of which can best be appreciated from figure 88*d*; one of 6 setae a strong, curved spine. Exopodite small, elongated, with 4 setae.

Maxilla (fig. 88*e*) with 2 small praecoxal endites and one coxal endite, number of setae 4, 3, and 3 respectively. Basal endite better developed, with strong, coalescent spine and seta; endopodite strongly reduced, with 2 setae.

Maxillipede (fig. 80*f*) of usual type, chelate. Coxa with 2 spinulose setae; basis moderately swollen, with 2 setae along internal margin. Endopodite unsegmented, claw-shaped, as long as basis, with 2 additional setae.

The structure of the genital field appears in figure 87*c*. Genital plates on both sides with long, plumose seta and 2 shorter spines. 2 egg balls attached to genital somite, each containing 8 eggs.

Leg 1 (fig. 88*g*) with 3-segmented endopodite and exopodite; 1st endopodal segment long and styliform, longer than whole exopodite, 4 times as long as wide, with subapical seta at internal margin. 3rd endopodal segment 5 times as long as wide, twice as long as segment 2, with 2 hooked spines of unequal length. 3 exopodal segments of nearly same length; no seta at internal margin of segment 2; 3rd segment with total of 4 appendages.

Legs 2 to 4 (figs. 88*h–j*) are as in *Robertgurneya rostrata* (see below); the setal formula is:

	endopodite	*exopodite*
leg 2	1.1.121	0.1.123
leg 3	1.1.221	0.1.123
leg 4	1.1.121	0.1.223

Leg 5 (fig. 88*k*) with exopodite twice as long as broad; baso-endopodite reaching along ⅔ of exopodite. Exopodite with 6 setae; 2 are lengthened. Baso-endopodite with 2 apical setae of unequal length and 3 internal setae.

Color completely faded, greenish transparent.

Remarks.—This species has a great general resemblance to *Robertgurneya rostrata*, but differs in the general shape of the body, the longer antennules, and particularly the shape of leg 5.

R. spinulosa has been recorded so far from Korshavn on the Skagerrak coast of Norway (Sars, 1911) and from Gullmar Fjord on the Skagerrak coast of Sweden (Lang, 1948). The present record is from a sand sample some 340 feet from the reef margin on Falarik in the Ifaluk Atoll. On both of the previous occasions the species was found also on sandy bottom in depths varying from 70 to 30 m. The female specimens recorded by Sars and Lang measured 0.55 mm.

Robertgurneya rostrata **(Gurney, 1927)**

Figures 87*d,e*, 89–91

Amphiascus rostratus Gurney, 1927, p. 527, fig. 144.—Monard, 1928a, pp. 378, 386.—Willey, 1935, p. 62, figs. 40–47.—Nicholls, 1939, p. 260.—Sewell, 1940, pp. 358, 369, 380.

Amphiascoides rostratus.—Nicholls, 1941b, pp. 71, 72, 73, 81, 83.

Robertgurneya rostrata.—Lang, 1948, p. 703, fig. 283 (no. 3).

Amphiascus ctenophorus Monard, 1928, p. 395, fig. 34 (no. 2); 1928a, p. 383.—Nicholls, 1939, p. 260.—Sewell, 1940, pp. 282, 358, 366, fig. 64.

Material.—Loc. 592, 2 ad. ♀♀, 0.41 and 0.42 mm.; 4 ad. ♂ ♂, 0.38–0.48 mm. (0.43 mm.); 3 ♀♀ cop. stage V, not measured.

Description.—The female is based on the two female specimens mentioned above; both have been dissected. The male of 0.48 mm. was also described and dissected.

Adult female, total length 0.41–0.42 mm.

Body moderately slender, with ovoid cephalothorax and narrower abdomen, both regions distinctly separated. Greatest diameter of body at 2nd thoracic somite, narrowing on both sides (fig. 87*d*). Head and 1st thoracic somite fused, as long as combined lengths of thoracic somites 2–4. Line of back in lateral view curved (fig. 89*a*), rostrum separated from back by deep groove, visible both laterally and dorsally. Rostrum long, triangular with blunt apex, well visible in dorsal view, pointing forward and slightly downward, as long as antennular segments 1 and 2. Ventrally it is hollowed; the margin is thickened. Thoracic somites 2 and 3 of nearly same length; 4th segment slightly shorter. Epimeral plates moderately developed, cut off squarely at end.

5th thoracic somite narrow but well visible in lateral and dorsal aspects. Genital somite composed of fused abdominal somites 1 and 2, in dorsal aspect as long as combined lengths of abdominal somites 3 and 4 (in the drawing of the lateral aspect a considerable part of the genital somite is telescoped under the 5th thoracic somite). Line of fusion between abdominal somites 1 and 2 obscure, but laterodorsally marked by row of spinules. Spinules also occur on sides of 3rd and 4th abdominal somites; the position can best be seen from figures 87*d*, 89*a*. Anal somite slightly longer than 4th abdominal somite, spinules border insertion of furcal rami. Anal flap broadly rounded, haired.

Furca 1½ times as broad as long, with 5 marginal setae and 1 appendicular seta, and some scattered spinules along internal and external margins. Setae 1, 4, 5, and appendicular seta of moderate length, fine; setae 2 and 3 lengthened and thickened.

Antennules (fig. 90*f*) 8-segmented, ⅔ length of cephalic somite. 4th segment twice as long as broad, with small conical process bearing aesthetasc and 2 setae.

The antenna and mouth parts are the same as in the male and will be described below.

Leg 1 (fig. 90*a*) with 3-segmented exopodite and endopodite. Coxa with spinulose external tubercles. Basis with slender external spine and big internal spine; insertion of endopodite placed on a socle bordered with spinules. Segments of exopodite of nearly same length, 2nd without internal seta; 3rd with total of 4 appendages. Endopodite styliform, longer than whole exopodite, with fine subapical, internal seta, 3½ times as long as wide. 2nd endopodal segment small, with internal seta. 3rd endopodal segment 2½ times as long as wide, with 2 very unequal, geniculate spines and fine seta at apex.

Exopodites and endopodites of legs 2 to 4, 3-segmented; the particulars of these feet can be taken from figures 90*b–d* and from the setal formula:

	endopodite	*exopodite*
leg 2	1.1.121	0.1.123
leg 3	1.1.221	0.1.123
leg 4	1.1.121	0.1.223

Baso-endopodite of leg 5 (fig. 90*e*), both sides closely approaching each other but not touching, each with 5 setae, innermost seta short. Exopodite 1¼ times as long as wide, with 6 setae, 2 of which are lengthened; external margin spinulose.

Color completely faded, colorless, transparent.

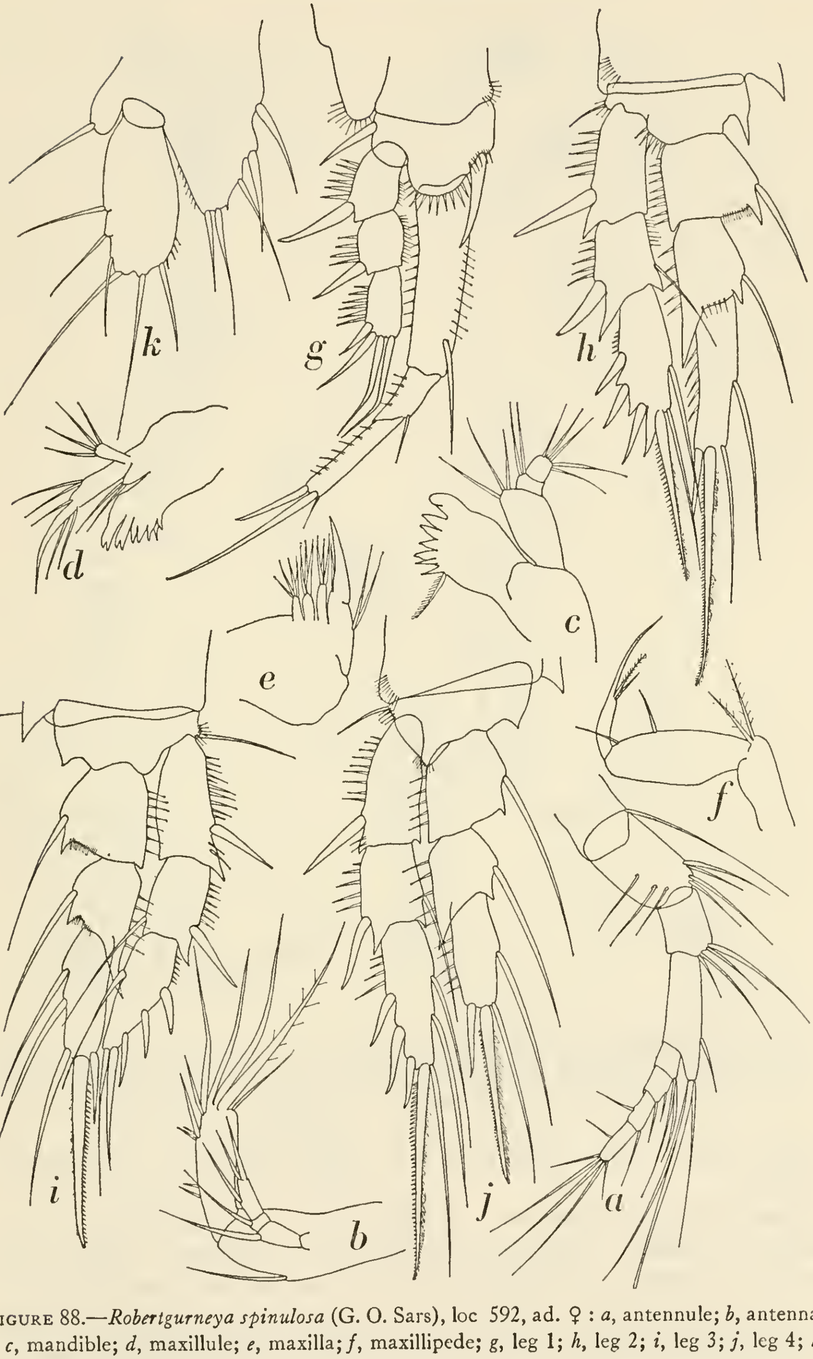

FIGURE 88.—*Robertgurneya spinulosa* (G. O. Sars), loc 592, ad. ♀ : *a*, antennule; *b*, antenna; *c*, mandible; *d*, maxillule; *e*, maxilla; *f*, maxillipede; *g*, leg 1; *h*, leg 2; *i*, leg 3; *j*, leg 4; *k*, leg 5. (× 460.)

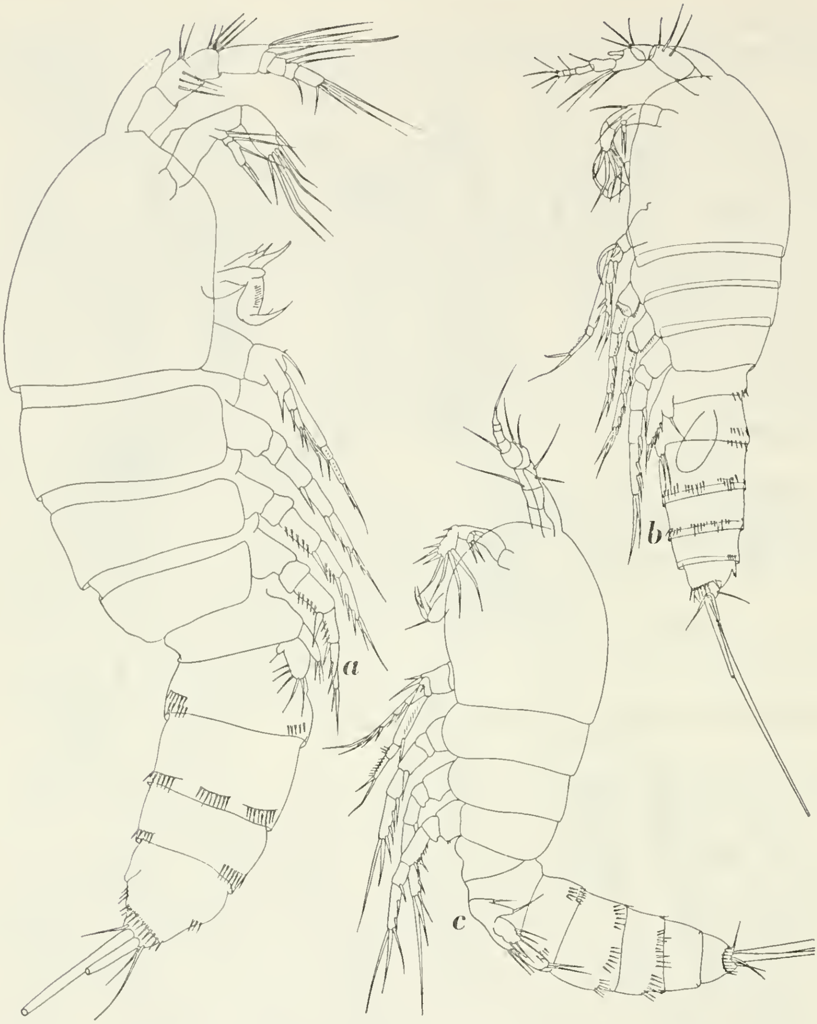

FIGURE 89.—*Robertgurneya rostrata* (Gurney), loc. 592, ad. ♀ : *a*, whole animal, lateral view from right side; loc. 592, ad. ♂, second specimen: *b*, whole animal, lateral view from left side; loc. 592, ad. ♂ : *c*, whole animal, lateral view from left side. (*a*, × 275; *b*, *c*, × 165.)

Adult male, total length 0.48 mm.; length of longest furcal seta 0.15 mm.

General shape of body as in female, with ovoid cephalothorax and slender abdomen, both regions distinctly separated. Head and 1st thoracic somite completely fused, as long as combined lengths of thoracic somites 2 to 4. Back broadly curved (figs. 89*b*,*c*), sides produced to shield basal parts of oral appendages. Rostrum as in female, separated from head by groove, curved, as long as antennular segments

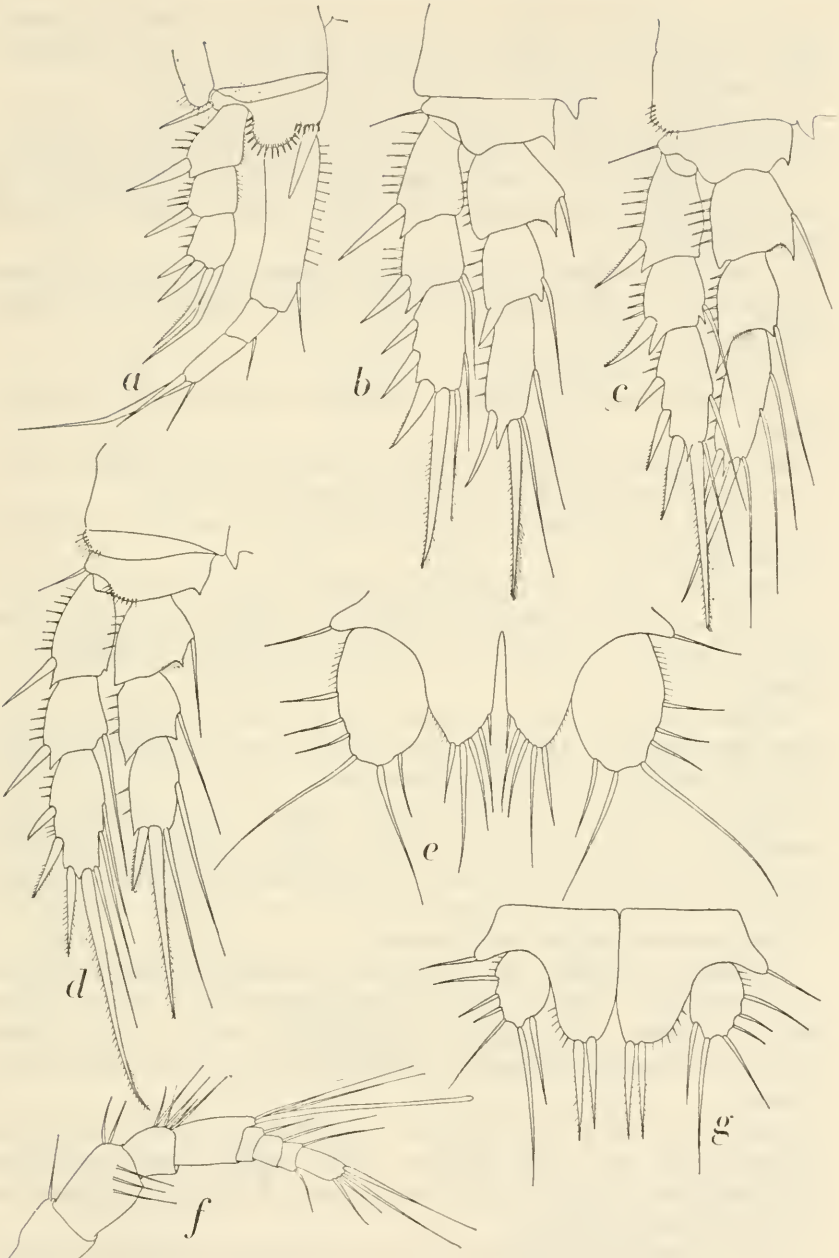

Figure 90.—*Robertgurneya rostrata* (Gurney), loc. 592, ad. ♀ : *a*, leg 1; *b*, leg 2; *c*, leg 3; *d*, leg 4; *e*, leg 5; *f*, antennule; loc. 592, ad, ♂: *g*, second specimen, leg 5. (× 460.)

1 and 2. Thoracic somites 2 to 4 of nearly same length, epimeral plates moderately developed, in 2 and 3 rounded, in 4 cut off squarely. Thoracic somite 5 distinctly visible dorsally and laterally.

Abdomen 5-segmented, strongly spinulose. All abdominal somites, including anal somite, of nearly same length; spinulation as follows:

Genital somite: two rows of spinules on each side of dorsocaudal part of somite; some spinules near genital plates, which are armed with 3 setae each.

2nd and 3rd somites: a dorsolateral, a lateral, and a ventrolateral row on each side, forming an almost complete encirclement of distal parts of these somites.

4th somite: no spinules.

Anal somite: spinules border insertion of furcal rami; anal plate haired.

Rami of furca short, about twice as long as broad, setation as in female; lengthened setae 2 and 3 are plumose (fig. 87*e*).

A distinct, small spermatophore is visible in 1st and 2nd abdominal somites (fig. 89*b*).

Antennules 8-segmented, subchirocerate, hinge between segments 5 and 6. Segment 4 swollen, with short, stubby spine and conical process, bearing aesthetasc and 2 setae. Setation represented in figure 91*g*.

Antenna (fig. 91*h*) with 3-segmented exopodite, with 1, 1, and 3 setae respectively. Allobasis with internal seta, endopodite with total of 7 setae, 3 of which are geniculate.

Mandible (fig. 91*i*) with strongly developed praecoxal cutting edge, bearing 9 acute teeth, proximal 3 very strong. In addition there is a basal seta. Palp well developed, with big basipodite, carrying 3 setae. Endopodite indistinctly 2-segmented, with 2 and 3 setae respectively. Exopodite unsegmented, with 3 setae.

Arthrite of maxillule (fig. 91*j*) with 8 well-shaped, strong teeth, some spinulose. There is only 1 endite, apparently the coxal endite, bearing 2 setae. Epipodite well developed, with 2 strong setae. Endopodite fused to basipodite, with 3 setae. Exopodite small, with 4 setae.

On the maxilla I observed only 3 endites. Praecoxal and coxal endites small, each with 2 setae. Basal endite larger, coalescent with large curved spine. Endopodite strongly reduced, represented by 3 fine setae (fig. 91*k*).

Both maxillipedes damaged in my preparation; they are chelate, with a moderately swollen basis and an unsegmented, claw-shaped endopodite, as long as the basis.

Leg 1 (fig. 91*a*) differing from that in female by development of internal spine on basis. This spine is strongly developed and curved internally; at its base it has 2 smaller spines.

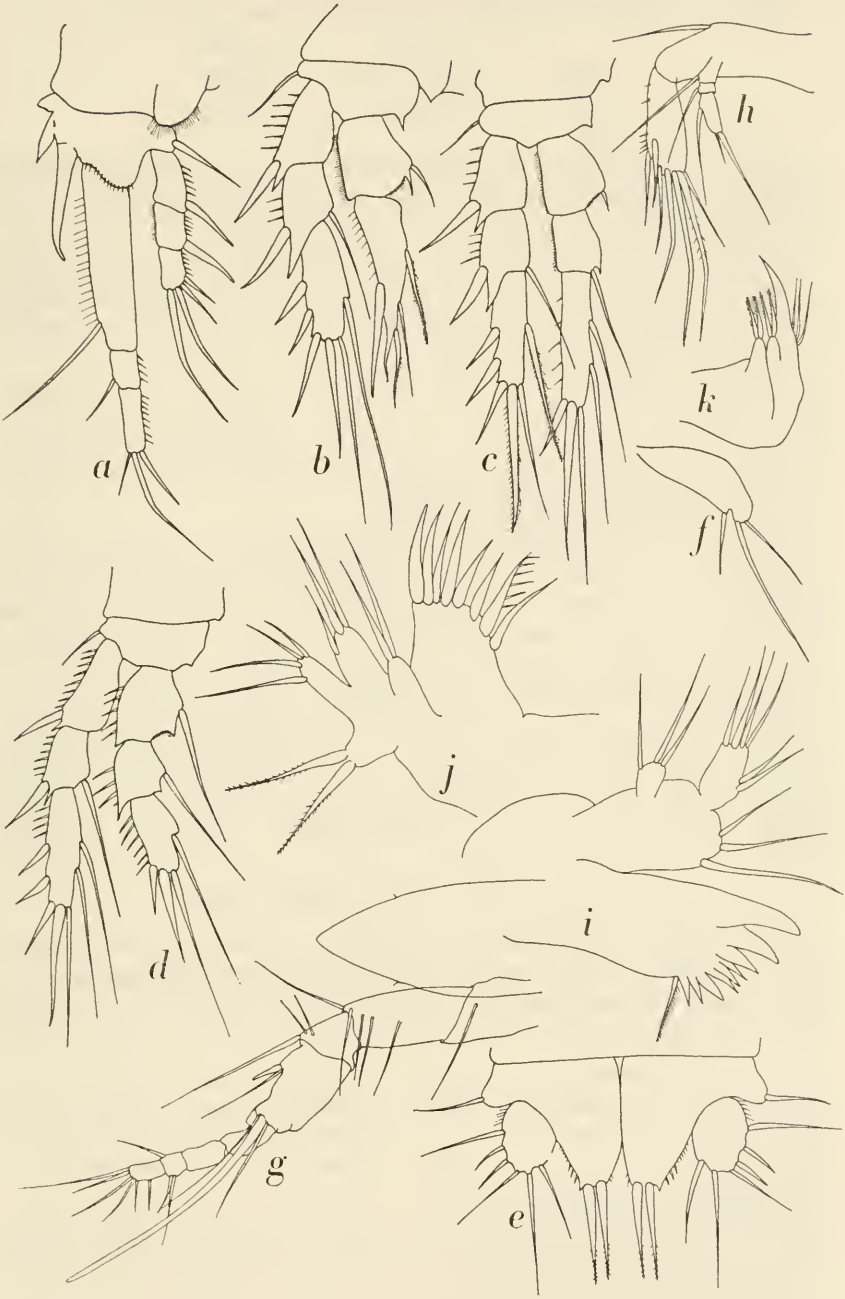

Figure 91.—*Robertgurneya rostrata* (Gurney), loc. 592, ad. ♂: *a*, leg 1; *b*, leg 2; *c*, leg 3; *d* leg 4; *e*, 5th legs; *f*, leg 6; *g*, rostrum and antennule, dorsal view; *h*, antenna; *i*, mandible; *j*, maxillule; *k*, maxilla. (× 460.)

Legs 2 to 4 (figs. 91*b*–*d*) with the following setal formula:

	endopodite	*exopodite*
leg 2	1. (modified)	0.1.123
leg 3	0.1.221	0.1.123
leg 4	1.1.121	0.1.223

Endopodite of leg 2 modified, internal seta on segment 1 small. Segment 2 with finely tapering point, external margin with big, articulating spine; internal margin with 3 setae (fig. 91*b*).

Endopodite of leg 3 without seta at internal margin of 1st segment, but this seta may have been removed by dissection. Whole endopodite, but especially 3rd segment, lengthened, longer than exopodite; setae on 3rd segment strong (fig. 91*c*).

Baso-endopodites of leg 5 of both sides touching; exopodite small, shorter than baso-endopodite, with total of 6 setae, distribution of which can best be seen from figures 90*g*, 91*e*. Baso-endopodite with 2 strong apical spines, haired at apex, and spinulose external border. Color, as in female, completely faded.

REMARKS.—The distribution of this species has been discussed by Lang (1948). It has been recorded from Banyuls-sur-Mer on the Mediterranean coast of France (Monard, 1928, as *Amphiascus ctenophorus*); from Port Said, Egypt (Gurney, 1927); and from Harrington Sound in the Bermuda Islands (Willey, 1935). From the Indo-Pacific area it has been recorded from Nancowry Harbour in the Nicobar Islands and from Addu Atoll in the Maldive Archipelago, in both localities from weed washings, the females measuring 0.70 mm. (Sewell, 1940). In the Ifaluk collection the species occurs in a sand sample taken 340 feet from the reef margin on Falarik in the Ifaluk Atoll.

Genus *Amphiascoides* Nicholls, 1941

I have pointed out earlier (p. 193) that Lang's genus *Amphiascella* must be dropped in favor of Nicholls' genus *Amphiascoides*. The type species is *Dactylopus debilis* Giesbrecht, 1881. The following species are known:

FEMALES	MALES
Dactylopus brevifurca Czerniavski, 1868	*D. brevifurca* Czerniavski, 1868
D. debilis Giesbrecht, 1881	*D. debilis* Giesbrecht, 1881
Stenhelia dispar T. and A. Scott, 1894	*S. dispar* T. and A. Scott, 1894
S. limicola Brady, 1899	
Dactylopus littoralis T. Scott, 1903	
S. neglecta Norman and T. Scott, 1905	*S. neglecta* Norman and T. Scott, 1905
Amphiascus nanus G. O. Sars, 1906	
A. nanoides G. O. Sars, 1911	
A. proximus T. Scott, 1914	
A. sterilis Monard, 1926	
A. subdebilis Willey, 1935	*A. subdebilis* Willey, 1935
A. calcarifer Sewell, 1940	*A. calcarifer* Sewell, 1940

Specimens of *Amphiascoides subdebilis* occur in the Ifaluk collection.

Amphiascoides subdebilis (Willey, 1935)

FIGURES 92*a*,*b*, 93, 94

Amphiascus subdebilis Willey, 1935, p. 64, figs. 49–52.—Nicholls, 1939, p. 265.—Sewell, 1940, p. 266.

Amphiascoides subdebilis.—Nicholls, 1941, p. 415; 1941b, pp. 81, 82.—Klie, 1950, p. 85.—Noodt, 1955a, p. 207.

Amphiascella subdebilis.—Nicholls, 1939, p. 265.—Lang, 1948, p. 718, fig. 290.—Roe, 1960, p. 283.

Amphiascus subdebilis var. *intermixtus* Willey, 1935, pp. 64, 65, fig. 48.

Amphiascus intermixtus.—Nicholls, 1941, p. 415, fig. 18; 1941b, pp. 81, 82.

Amphiascus debilis Monard, 1928, p. 390, fig. 32 (no. 3); 1935a, p. 31; 1937, p. 43.

Amphiascus debilis pp. Monard 1928a, pp. 381, 383.—Pesta, 1932, p. 63.

MATERIAL.—Loc. 589, 2 ov. ♀♀, 0.42 and 0.50 mm. Loc. 592, 1 ad. ♀, 0.45 mm., 1 ov. ♀, 0.54 mm. Loc. 800, 1 ad. ♀, 0.42 mm.

DESCRIPTION.—The material of this form falls into two different groups, 0.42–0.45 mm. and 0.50–0.54 mm. long respectively, which are slightly different in the external appearance and setation of leg 5. Both will be described.

Adult female (loc. 592), total length 0.54 mm.; greatest diameter 0.14 mm.; length of longest furcal seta 0.27 mm.; proportional length of cephalothorax and abdomen is 1:1.

General shape of body slender, with greatest diameter at middle of cephalic somite, anteriorly and posteriorly narrowing, without sharp demarcation between cephalothorax and abdomen, but division visible by slight lateral expansion of 5th thoracic somite (fig. 92*a*). Head and 1st thoracic somite completely fused to form cephalic somite, which is slightly longer than combined lengths of thoracic somites 2 to 4. Back gently curved and running into rostrum; sides of cephalic somite only slightly produced to cover extreme basal portion of oral appendages (fig. 92*b*). Rostrum short, triangular with rounded apex, base broad, curved forward and downward, separated from cephalic somite by shallow groove, as long as antennular segments 1 and 2. Ventrolateral parts of cephalic somite not produced. Epimeral plates of thoracic somites 2 to 4 rounded and slightly backwardly produced.

5th thoracic somite distinctly visible laterally and dorsally; in dorsal aspect slightly laterally produced. Genital somite resulting from fusion of abdominal somites 1 and 2, line of fusion visible dorsally and laterally, broader than long (proportion 9:7), slightly shorter than combined lengths of abdominal somites 3 and 4. There are no spinules on the abdominal somites. Anal somite shorter than preceding somites, anal plate very broadly rounded, nude. Spinules border insertion of furcal rami on anal somite.

Furcal rami short, 4 times as wide as long, widely separated, parallel. There are 5 marginal setae and 1 appendicular seta on each ramus. Seta 1 and appendicular seta fine and short, seta 4 spiniform, fairly long, seta 5 very small, scarcely visible. Setae 2 and 3 lengthened and thickened, especially the 2nd; both swollen at base, swollen part long. Some spinules at internal border of each ramus. Appendicular seta insert at extreme internal corner of each ramus.

Antennules 8-segmented, short, half length of cephalothorax. 4th segment short, with large conical process bearing aesthetasc and 2 setae. Setation represented in figure 93*f*.

Antenna (fig. 93*g*) with allobasis and 3-segmented exopodite. 1 seta occurs on allobasis and 3 at 3rd exopodal segment. No setae were observed on basal 2 exopodal segments; they may have been removed by dissection.

Mandible (fig. 93*h*) with well-developed praecoxal cutting edge, bearing 5 composite teeth. Palp small, with slender basipodite, bearing 3 setae. Endopodite with 5 setae, segmentation indistinct. Exopodite unsegmented, with 2 setae.

Maxillule damaged in my dissection.

Maxilla with 1 praecoxal, 2 coxal, and 1 basal endite. Praecoxal and coxal endites each with 3 fine setae. Basal endite large, with coalescent, strong spine, and 1 additional seta. Endopodite reduced, represented by 3 setae.

Maxillipede chelate, basis moderately swollen. Endopodite unsegmented, curved, slightly shorter than basis.

Leg 1 (fig. 93*a*) with strong internal and external spine on basis; exopodite and endopodite 3-segmented. Exopodite and apex of endopodal segment 1 reach same level, but exopodite inserting more basally, with the result that it is longer, in fact, than 1st endopodal segment. This segment 2½ times as long as wide, internal and external borders spinulose, with fine internal, subapical seta. 2nd and 3rd endopodal segments of equal length, 3rd with 2 very unequal, geniculate setae and fine seta. Details of legs 2 to 4 appear in figures 93*b–d* and the setal formula:

	endopodite	*exopodite*
leg 2	1.1.121	0.1.023
leg 3	1.1.221	0.1.123
leg 4	1.1.121	0.1.223

Leg 5 with ovoid exopodite, slightly longer than baso-endopodite. There are 5 exopodal, marginal setae; the size can best be judged from figure 93*e*. Internal and external margins spinulose. Baso-endopodite with 5 setae and some marginal spinules.

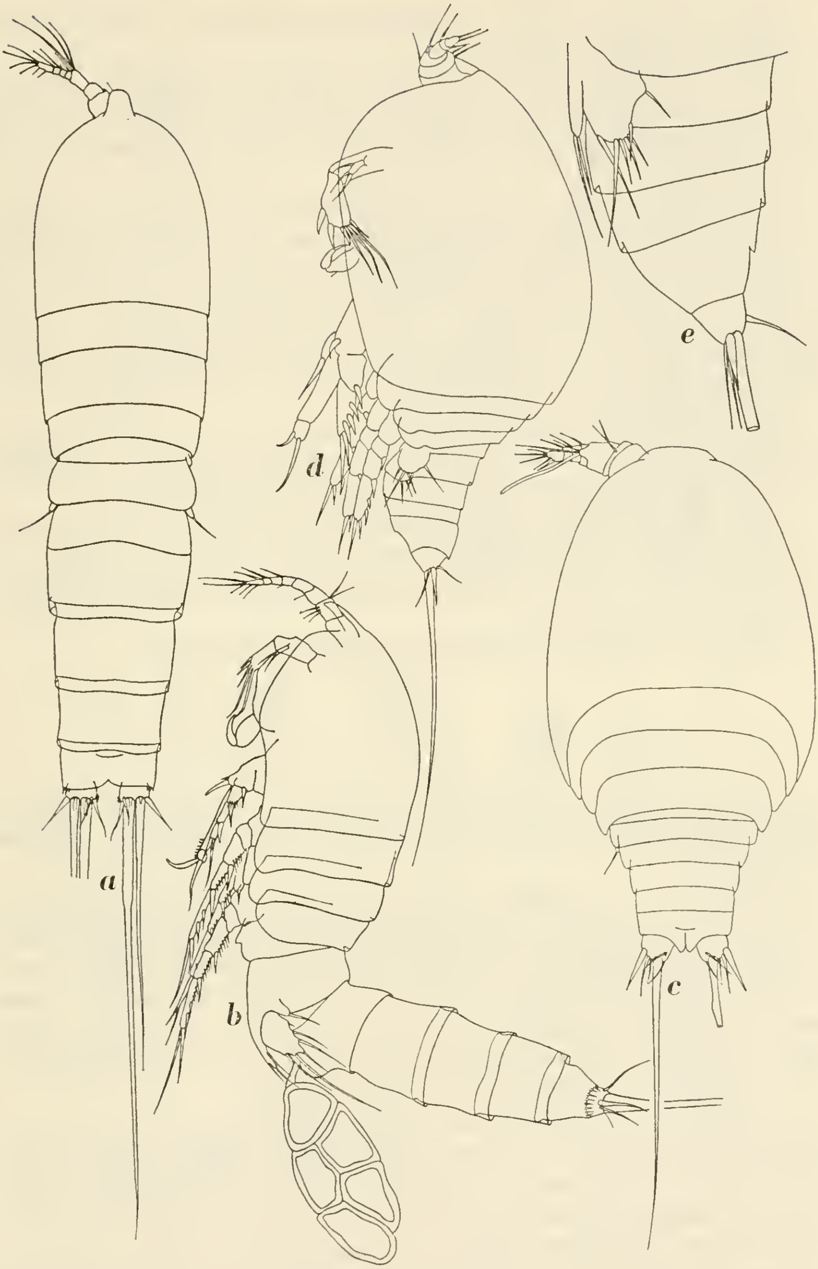

FIGURE 92.—*Amphiascoides subdebilis* (Willey), loc. 592, ad. ♀: *a*, whole animal, dorsal view; *b*, same animal, lateral view from left side. *Parialysus robustus* (Nicholls), loc. 592, ♂ cop. stage V: *c*, dorsal view of whole animal; *d*, same animal, lateral view from left side; ad. ♀: *e*, abdomen, lateral view from left side. (*a-d*, × 165; *e*, × 275.)

Color completely faded, transparently whitish. Female carries two sacs, each with 5 large eggs.

Adult female (loc. 800), total length 0.42 mm.; greatest diameter 0.11 mm.; length of longest furcal seta 0.38 mm. This form will not be described in detail, but the differences with the previous form will be mentioned.

Body slightly more robust, probably as result of strong contraction. This is particularly apparent in the abdomen, where the hyaline distal membrane of the somites stands out quite clearly (fig. 94*a*). In addition, there are some lateroventral spinules on the distal part of genital, 3rd, and 4th abdominal somites. The setation of the furcal rami is identical, but the long 2nd and 3rd setae are not swollen basally and are setose (fig. 94*c*).

Antennules (fig. 94*e*) trifle slenderer than in first form, reaching ⅔ length of cephalic somite. Exopodite of antenna (fig. 94*f*) indistinctly segmented, with 4 setae at terminal exopodal segment.

Leg 1 (fig. 94*g*) different by greater length of 1st endopodal segment, which is longer than exopodite and 5 times as long as wide. 3rd endopodal segment about twice as long as 2nd, with 2 unequal, geniculate setae and fine seta.

Legs 2 to 4 (figs. 94*h–j*) with following setal formula:

	endopodite	*exopodite*
leg 2	1.1.121	0.1.023
leg 3	1.1.221	0.1.123
leg 4	1.1.121	0.1.223

Structure of leg 5 (fig. 94*k*) almost identical, but decided difference in development of various setae, as best seen in comparison of figures 94*k* and 93*e*.

Remarks.—The differences between the two forms recorded above do not seem to justify specific distinction, the more so since some variability in this form has already been recorded by Willey, who, in addition to the typical form, described a variety *intermixtus*, based on differences in the shape of the setae of leg 5. It seems probable that the study of more material will reveal a greater variability in this rare species than hitherto has been suspected.

Amphiascoides subdebilis has been recorded from Agar's Island and Harrington Sound in the Bermuda Islands (Willey, 1935: ♀ 0.47–0.69 mm., ♂ 0.36 mm.); Lough Ine of County Cork, Ireland (Roe, 1960); Teneriffe in the Canary Islands (Noodt, 1955a: ♀ 0.60 mm., ♂ 0.48 mm.); Roscoff, France, on the English Channel (Monard, 1935a: ♂ 0.31–0.54 mm.); Banyuls-sur-Mer on the Mediterranean coast of France (Monard, 1928); and Sellick Beach and Reef in South Australia (Nicholls, 1941: ♀ 0.90 mm.). The specimens recorded by Nicholls are very large and show small structural differences with

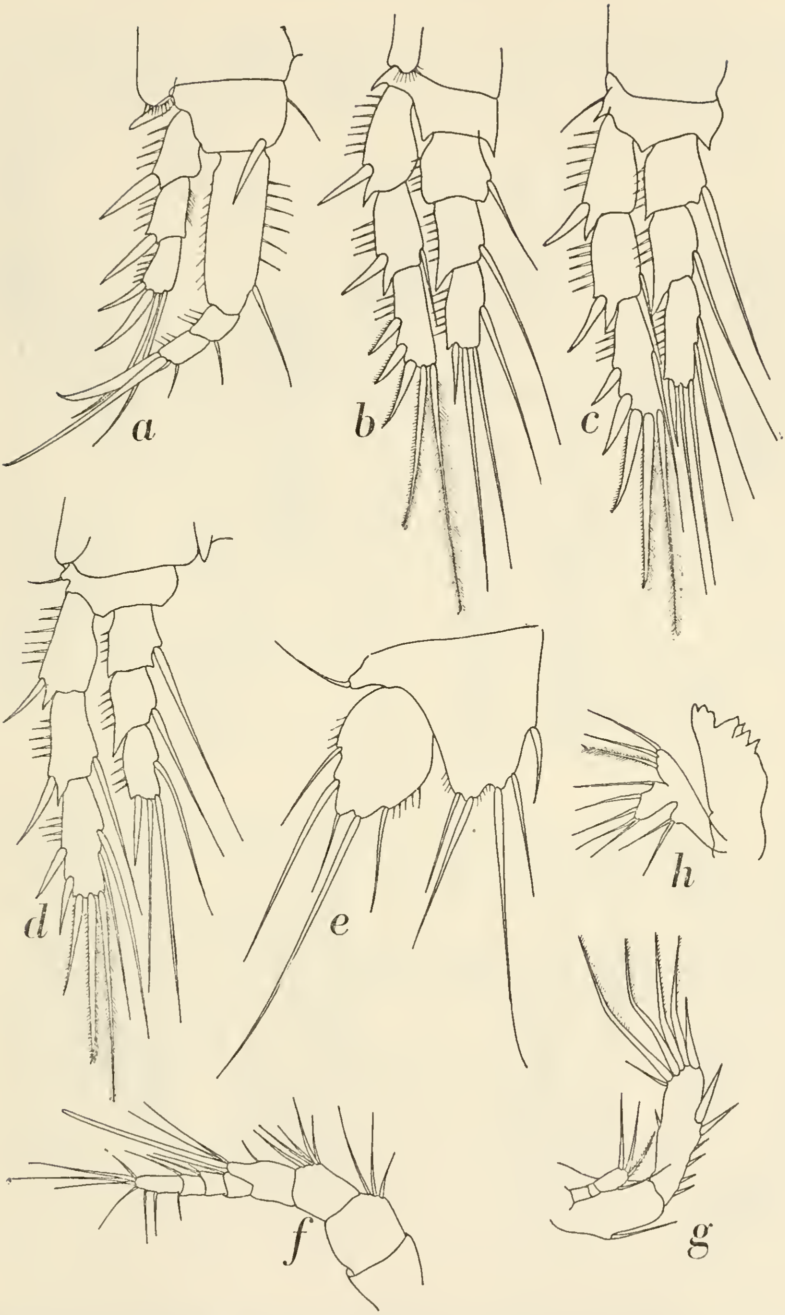

Figure 93.—*Amphiascoides subdebilis* (Willey), loc. 592, ad. ♀ : *a*, leg 1; *b*, leg 2; *c*, leg 3; *d*, leg 4; *e*, leg 5; *f*, antennule; *g*, antenna; *h*, mandible. (× 520.)

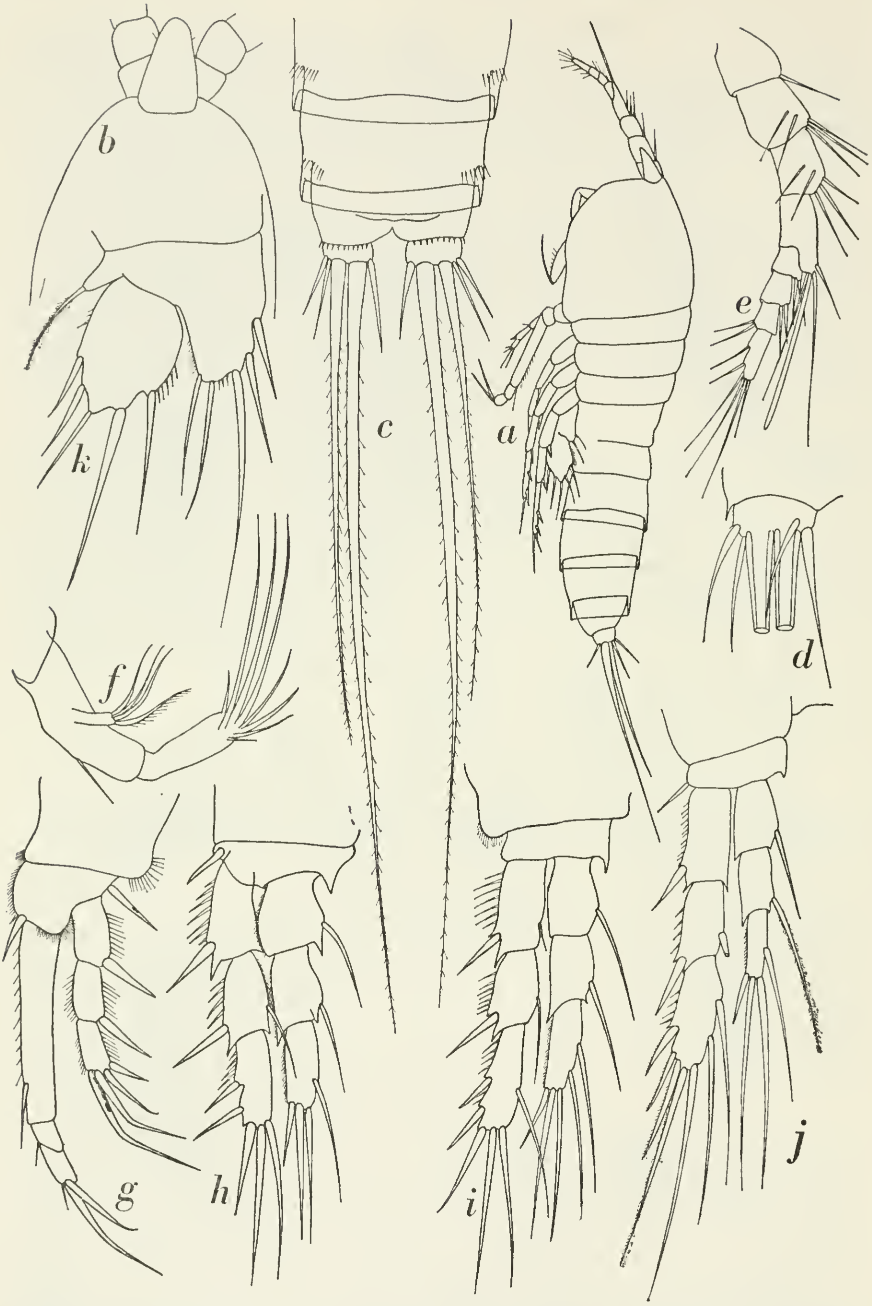

FIGURE 94.—*Amphiascoides subdebilis* (Willey), loc. 800, ad. ♀: *a*, whole animal, lateral view from left side; *b*, rostrum and basal parts of antennules, dorsal view; *c*, distal part abdomen and furca, ventral view; *d*, left furcal ramus, dorsal view; *e*, antennule; *f*, antenna; *g*, leg 1; *h*, leg 2; *i*, leg 3; *j*, leg 4; *k*, leg 5. (*a*, × 145; *b*, *c*, × 275; *d–k*, × 460.)

the form recorded above. In the Ifaluk collection the species occurs almost exclusively in sand samples taken at various distances from the reef border; the specimen from locality 800 probably also comes from a sandy bottom.

Genus *Parialysus* Nicholls, 1941

The three monotypic genera *Tydemanella* A. Scott, 1909 (type species *T. typica* A. Scott, 1909), *Ialysus* Brian, 1927 (type species *I. rufus* Brian, 1927), and *Parialysus* Nicholls, 1941 (type species *Tydemanella robusta* Nicholls, 1941) certainly are closely related. I have not attempted to redefine *Parialysus* since I have no males of this genus at my disposal. The differences separating the three genera have been tabulated by Nicholls (1941b, p. 90). The two species described by Sewell as *Jalysus investigatoris* (1940, p. 230, figs. 44, 45) and *J. proximus* (1940, p. 234, fig. 46) differ so completely in setation from our present concept of *Tydemanella*, *Ialysus*, and *Parialysus* that the institution of a new genus for their reception seems necessary. It seems probable, as already has been suspected by Nicholls (1945, p. 15), that Sewell has confused the legs in his description of *Jalysus investigatoris*. Some specimens of *P. robustus* occur in the Ifaluk collection and are described below.

Parialysus robustus (Nicholls, 1941)

FIGURES 92*c–e*, 95–97

Tydemanella robusta Nicholls, 1941, p. 417, fig. 19.—Sewell, 1949, p. 172.
Parialysus robustus.—Nicholls, 1941b, pp. 90, 91; 1944a, p. 491; 1945, p. 7, fig. 3B.

MATERIAL.—Loc. 592, 2 juv., one a ♂ cop. stage V, 0.39 mm.; 2 ad. ♀♀, 0.47 and 0.68 mm. length.

DESCRIPTION.—The male copepodite stage V and the adult female of 0.47 mm. have been described completely; both have been dissected and mounted.

Male copepodite stage V, total length 0.39 mm.; greatest diameter 0.20 mm.; length of longest furcal seta 0.33 mm.

Body strongly and characteristically built, with large, ovoid cephalothorax and small, short abdomen; proportional length of both regions is 27:10. Body fairly strongly curved, with the result that, in dorsal view, cephalic somite appears too large and remaining somites too small. Head and 1st thoracic somite fused, forming huge cephalic somite, twice as long as rest of body. Greatest diameter of body at end of cephalic somite, very broadly rounded anteriorly; posteriorly narrowing considerably (fig. 92*c*). Back, in lateral view, very broadly rounded and curving imperceptibly into small rostrum, separated from head by shallow groove (fig. 92*d*). Lateral parts of cephalic somite much produced and completely shielding oral appendages. Rostrum short, with broad base, which is only partly visible from above, apex blunt (fig. 95*f*). Thoracic somites 2 to 4 of equal length; epimeral plates rounded and backwardly slightly produced, accentuated by small distal incision.

5th thoracic somite very narrow, scarcely visible in dorsal or lateral aspect. Abdomen 5-segmented, but 1st and 2nd somites separate, 4th and anal somite indistinctly separated. Somites 1 to 4 of equal length, anal somite slightly longer. Anal operculum small, rounded, and nude. All abdominal somites are nude.

Furcal rami widely separate, divergent, slightly narrowing distally. Each ramus has 5 marginal setae and 1 appendicular seta. Seta 1, 3, and appendicular seta fine and small; seta 4 slightly stronger. Seta 2 considerably lengthened and thickened, reaching half body length. Seta 5 short and spiniform.

Antennules (fig. 95*f*) very short, ⅓ length of cephalothorax, 7-segmented. Segments 1 and 2 broad and short, segment 3, apparently composed of two fused segments, with small conical process bearing aesthetasc and several setae. Complete setation represented in figure 95*f*.

Antenna exactly as in adult female and not described here in detail.

Mandible with well-developed praecoxal cutting edge, bearing 5 acute teeth and fine basal seta. Palp 2-segmented, with 4 apical setae (fig. 95*g*).

Maxillule (fig. 95*h*) with well-developed arthrite, bearing 4 curiously formed teeth. Rest of appendage strongly reduced, present as lobe with 4 setae.

Maxilla and maxillipede as in adult female, not to be described in detail here.

Legs 1 to 4 (figs. 95*a–d*) differing from those of adult female by absence of jointing between 2nd and 3rd segments of exopodite and endopodite. Number of setae and spinules as in adult stage, with exception of endopodite of leg 2. In adult female setae on 2nd and 3rd endopodal segments of leg 2 number 7; in this stage, only 6.

Leg 5 (fig. 95*e*) complete, shaped as male 5th leg figured by Nicholls (1941, fig. 19). Baso-endopodite has 2 strong, spinulose spines. Exopodite slightly longer than broad, 2 of marginal setae thickened.

Leg 6 (armature of genital plate) at this stage with only 2 setae (3 are figured for the adult male by Nicholls).

I have described this specimen as an immature male because of the development of the 5th legs; the segmentation of antennule and legs make the Vth stage very likely.

Adult female, total length 0.47 mm.; greatest diameter 0.26 mm.; length of longest furcal seta 0.36 mm.

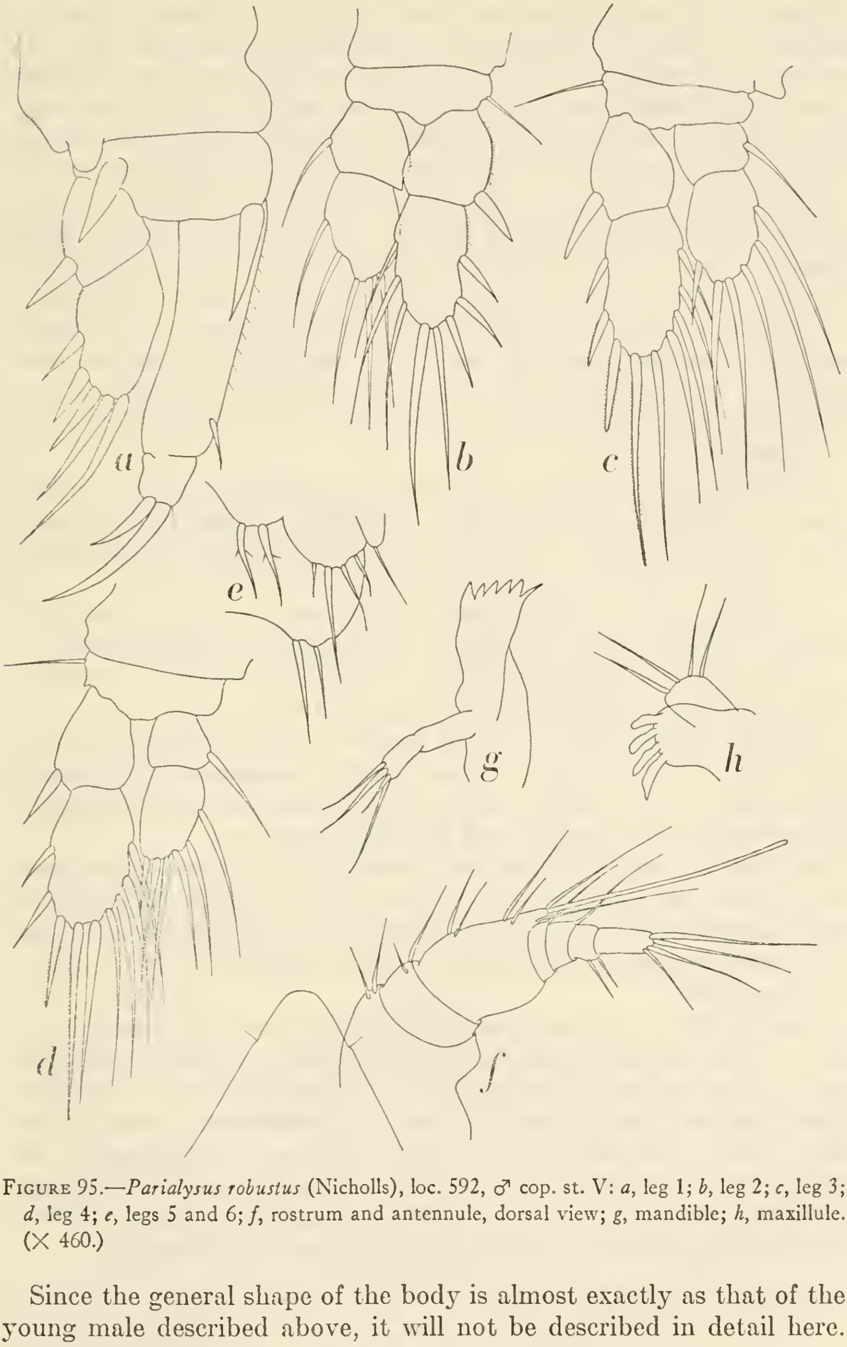

FIGURE 95.—*Parialysus robustus* (Nicholls), loc. 592, ♂ cop. st. V: *a*, leg 1; *b*, leg 2; *c*, leg 3; *d*, leg 4; *e*, legs 5 and 6; *f*, rostrum and antennule, dorsal view; *g*, mandible; *h*, maxillule. (× 460.)

Since the general shape of the body is almost exactly as that of the young male described above, it will not be described in detail here. Proportional length of cephalothorax and abdomen is 22:9; the abdomen here is fully developed (fig. 92*e*). Genital somite broad, barrel-shaped, composed of fused somites 1 and 2, 1½ times as long as somite 3. Line of fusion very distinct dorsally and laterally. All abdominal somites are strongly telescoped and bear no spinules. Anal somite fairly long, twice as long as somite 4, with broad anal flap. Furcal rami diverging, slightly broader than long, structure as in immature specimen. Rostrum obliquely downwardly curved, triangular plate with very broad base (fig. 96*b*) and blunt apex, separated from head by distinct groove. Two lateral incisions, each bearing a hair, indicate position of frontal organ. Rostrum here is slightly shorter than it appears to have been in Nicholls' specimen.

Antennules very short, ¼ length of cephalothorax, 8-segmented, setation represented in figure 96*b*, with some slight differences from Nicholls' drawing (1941, fig. 19): there is only one aesthetasc on segment 4 and none on segment 3, but one of the setae here is lengthened.

Antenna (fig. 96*c*) short and powerful, especially allobasis, which bears no internal seta but row of spiniform hairs. Exopodite 1-segmented, with 3 setae. Total number of appendages on endopodite 7, 2 of which are geniculate setae.

Mandible with well-developed cutting edge on praecoxa; palp reduced, composed of 2 segments, the apical bearing 4 small setae.

Praecoxal arthrite of maxillule well developed; rest of maxillule reduced to form small lobe with 4 strong setae.

Maxilla (fig. 96*d*) with only 2 endites: small coxal endite, with single small seta, and larger basal endite, coalescent with strong, curved spine. In addition, there is a fine seta on the basal endite. Endopodite reduced and present as single fine seta.

Maxillipede (fig. 96*e*) chelate, powerful. Coxa well developed, with 2 setae and some spinules. Basis strongly swollen, internal and external border convex, internal border haired. Endopodite composed of 2 fused segments, half length of basis, curved, pointed, with 1 additional seta.

Leg 1 (fig. 97*a*) with 2-segmented endopodite and 3-segmented exopodite. Coxa big and broad, bordered with spinules along insertion of basis. Basis with big internal and external marginal spine. Exopodite slightly shorter than 1st endopodal segment, segments of equal length, 2nd without internal seta, 3rd with total of 4 appendages. 1st endopodal segment styliform, 3 times as long as wide, with short, subapical internal seta. 2nd endopodal segment as long as wide, with 2 strong but very unequal, hooked spines and a fine seta.

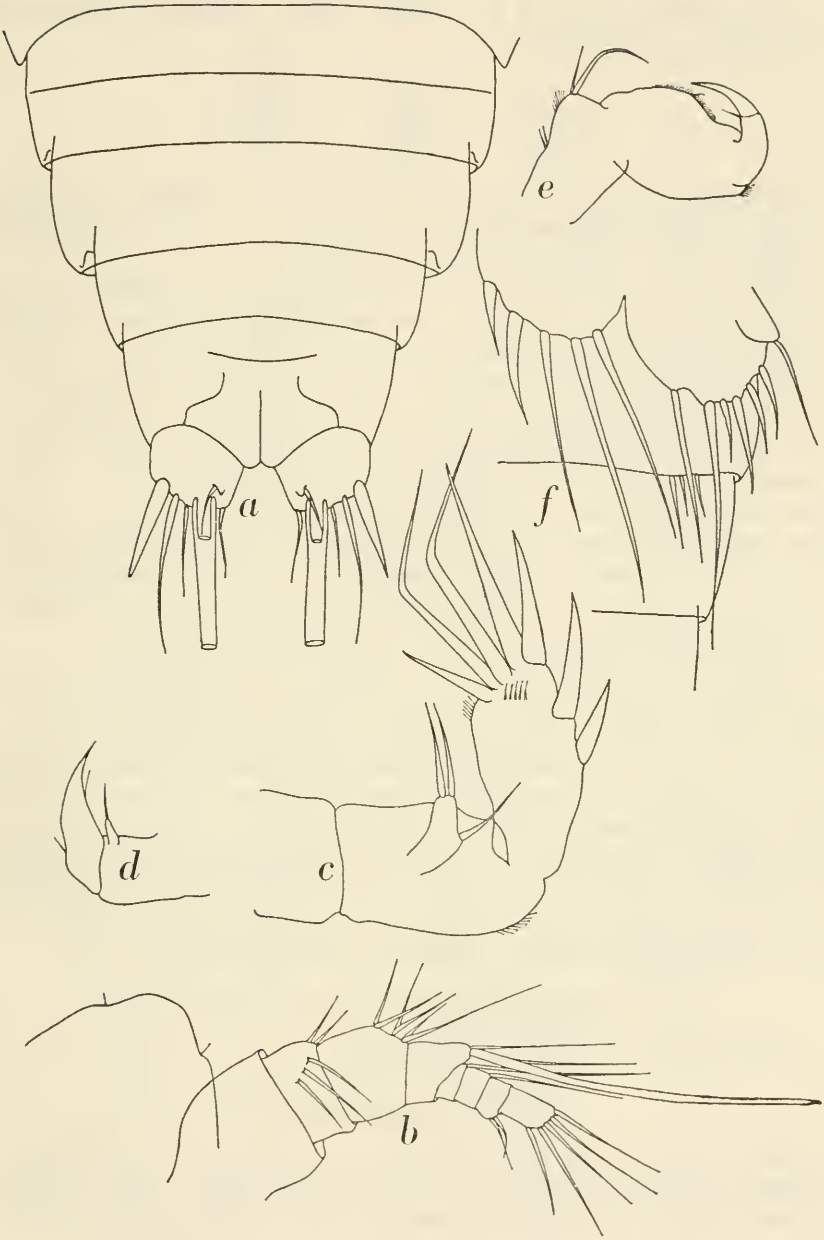

Figure 96.—*Parialysus robustus* (Nicholls), loc. 592, ad. ♀: *a*, abdomen, dorsal aspect; *b*, rostrum and right antennule, dorsal view; *c*, antenna; *d*, maxilla; *e*, maxillipede; *f*, legs 5 and 6. (× 460.)

Endopodites of legs 2 to 4 (figs. 97*b–d*) 3-segmented, legs with following setal formula:

	endopodite	*exopodite*
leg 2	1.1.121	0.1.222
leg 3	1.2.221	0.1.322
leg 4	1.1.221	0.1.322

Noteworthy are the absence of setae on the internal margins of the 1st exopodal segments and the presence of 2 setae on the internal surface of the 2nd endopodal segment of leg 3.

Leg 5 (fig. 97*e*) with large, oval, well-developed exopodite, indistinctly separated from smaller baso-endopodite. Baso-endopodites of both sides closely approximated but not coalescent. Apex of baso-endopodite reaches halfway along exopodite. Baso-endopodite with 5 marginal setae, 3 of which are lengthened. Exopodite with total of 6 setae, 2 innermost lengthened. External lobe with fine setae. Armature of genital plate composed of 3 setae (fig. 96*f*). Unfortunately, the genital somite was ruptured during dissection, with the result that I cannot give a description of the ventral aspect of the somite. It has been figured, however, by Nicholls (1941, fig. 19).

Color opaque greenish yellow, no eye or pigmented spots visible. The larger female carried a single sac containing 12 eggs.

REMARKS.—*Parialysus robustus* originally was described from a female specimen from Sellick Beach in South Australia and a male from Spencer Gulf in South Australia (Nicholls, 1941; ♀ 0.78 mm., ♂ 0.81 mm.). An additional female specimen occurred at Port Denison in Western Australia (Nicholls, 1945; ov. ♀ 1.1 mm.). The specimens were obtained from washings of stones and invertebrates off the edge of coral reefs. The present specimens are slightly smaller than those previously recorded but probably have been strongly contracted. They were obtained from a sand sample taken some 340 feet from the reef edge at Falarik in the Ifaluk Atoll.

Family Metidae G. O. Sars, 1910

This family includes but a single genus:

Genus *Metis* Philippi, 1843

This genus has a respectable number of synonyms: *Thoracosphaera* Kriczagin, 1873; *Ilyopsyllus* Brady and Robertson, 1873; *Abacola* Edwards, 1891; *Corazzoides* Grandori, 1912; *Rubeus* Grandori, 1912;

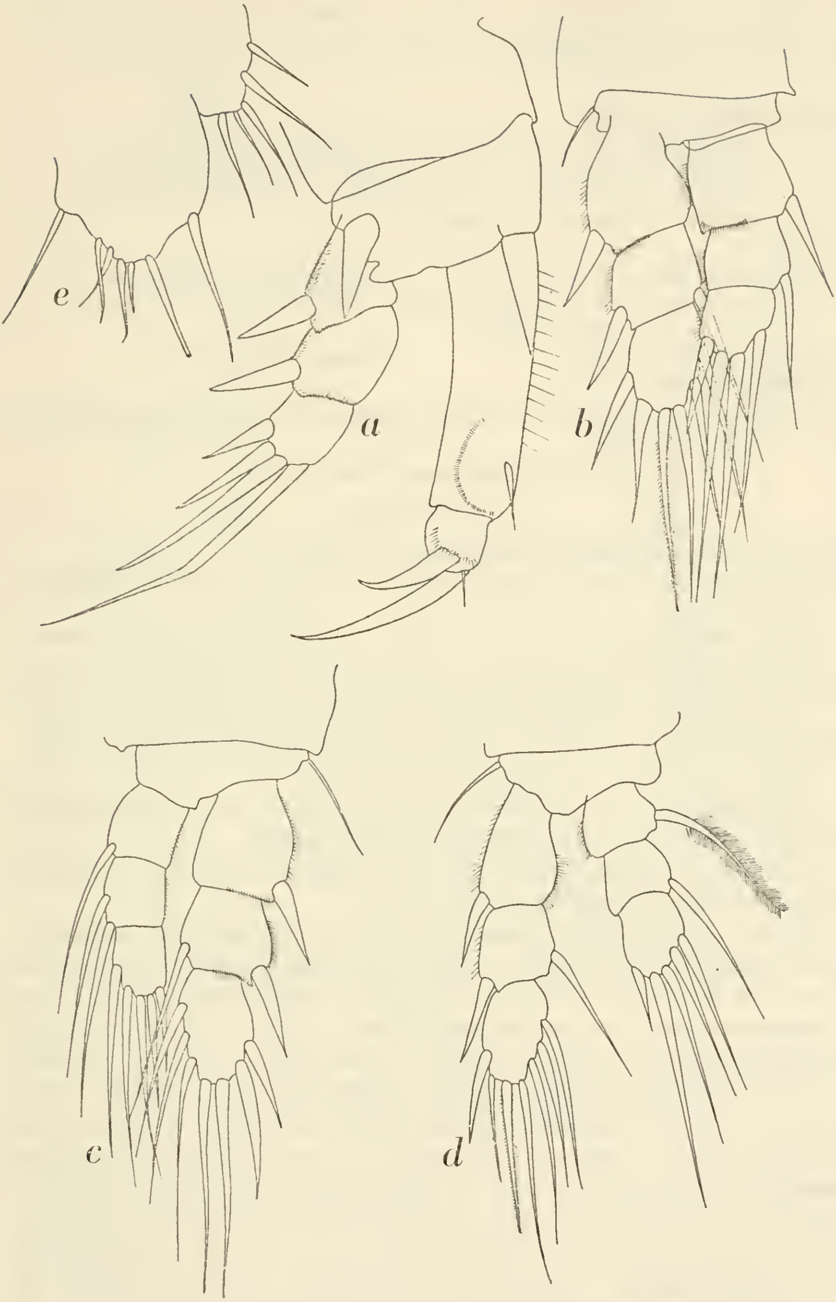

FIGURE 97.—*Parialysus robustus* (Nicholls), loc. 592, ad. ♀: *a*, leg 1; *b*, leg 2; *c*, leg 3; *d*, leg 4; *e*, leg 5. (× 460.)

and *Parametis* Labbé, 1926. The type species is *Metis ignea* Philippi, 1843. The following species and subspecies are now recognized:

FEMALES	MALES
Metis ignea Philippi, 1843	*M. ignea* Philippi, 1843
(=*Ilyopsyllus coriaceus* Brady and Robertson, 1873; *Thoracosphaera inflata* Kriczagin, 1873; *Carazzoides venctus* Grandori, 1912; *Rubeus venetus* Grandori, 1912; *Parametis sangineus* Labbé, 1926)	
M. i. halmyricola Marcus and Pór, 1961	
Abacola holothuriae Edwards, 1891	*A. holothuriae* Edwards, 1891
(=*Ilyopsyllus jousseaumei* Richard, 1892; *I. affinis* T. Scott, 1894; *I. Sarsi* Sharpe, 1910)	
I. natans Williams, 1907	*I. natans* Williams, 1907
M. pallida Gurney, 1927	

A single male specimen of *Metis holothuriae* occurs in the collection.

Metis holothuriae (Edwards, 1891)

FIGURES 98, 99

Abacola holothuriae Edwards, 1891, p. 92, pl. 5 (figs. 1–17).

Metis jousseaumei f. *minor* Sewell, 1940, p. 346, fig. 86.—Krishnaswamy, 1953, p. 75.

Metis jousseaumei f. *major* Sewell, 1940, p. 349, figs. 87, 88.—Krishnaswamy, 1953, p. 75.

Metis jousseaumei.—Nicholls, 1941, p. 425; 1941a, pp. 317–328, figs. 1–5; 1942a, p. 138; 1944a, p. 502; 1945, p. 14.—Carvalho, 1952, p. 164, pl. 2 (figs. 89–91).

Metis holothuriae.—Lang, 1948, p. 777, fig. 315 (no. 2)—Noodt, 1955a, p. 207.

MATERIAL.—Loc. 592, 1 ad. ♂, 0.51 mm.

DESCRIPTION.—The following is based on the only male specimen available, which has been dissected and mounted.

Adult male, total length 0.51 mm.; greatest diameter 0.19 mm.; length of longest furcal seta 0.42 mm.

Shape of body highly characteristic: strongly inflated cephalothorax, principally composed of very big cephalic somite, resulting from fusion of head and 1st thoracic somite. The remaining 4 thoracic somites are short and in this contracted specimen almost completely concealed under the distal border of the cephalic somite (fig. 98*b*). Abdomen short, not more than ¼ length of cephalic somite. Back strongly curved, vaulted, curving into short, strong, downwardly directed rostrum, apex of which is rounded and hidden between basal parts of antennules (fig. 98*a*). Sides of cephalic somite produced to shield basal parts of oral appendages. Thoracic somites 2 to 5 narrow, with rounded, scarcely produced epimeral plates, backwardly drawn out in rounded flap. 5th thoracic somite with distal fringe of spinules.

Abdomen composed of 5 somites, somites 1 and 2 separated. All abdominal somites, including the anal somite, have about the same

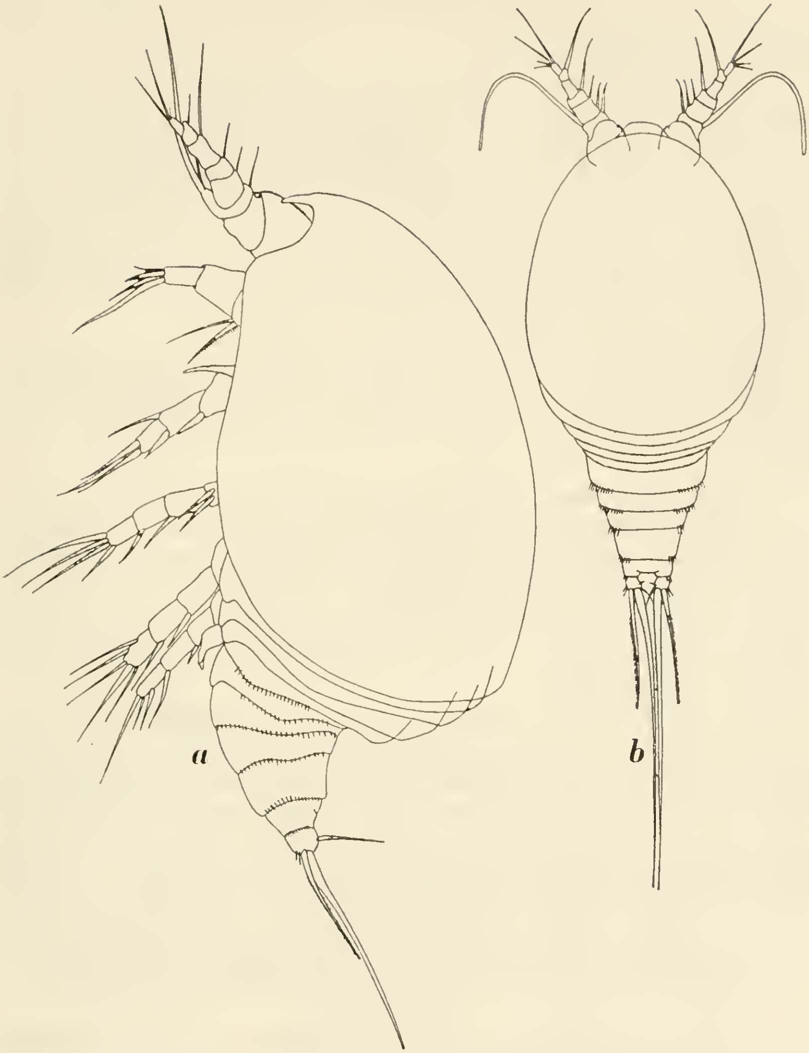

FIGURE 98.—*Metis holothuriae* (Edwards), loc. 592, ad. ♂: *a*, whole animal, lateral view from left side; *b*, same animal, dorsal view. (*a*, × 275; *b*, × 165.)

length and have spinules bordering their distal edges; such spinules also occur along the line of fusion on the genital somite. Insertion of furca on anal somite also fringed with spinules. Anal plate broadly rounded.

Furcal rami widely separated, as long as wide, with 5 marginal setae and 1 appendicular seta. Seta 1 and appendicular seta fine, setae 4 and 5 small, spiniform. Setae 2 and 3 lengthened and thickened, especially 2nd, which reaches ⅘ body length; 3rd is much shorter. Both setae are finely haired.

Rostrum (after dissection) proved to be triangular plate, apex provided with 2 movable, pointed appendages (fig. 99*a*).

Antennules haplocerate, 7-segmented; 1st segment of considerable size, with finger-shaped, denticulated process covering part of 2nd segment. 2nd and 4th antennular segments each with long aesthetasc. Penultimate segment with small, scale-shaped process. Setation represented in figure 99*a*; some of setae on this complicated structure may have a different insertion. In the presence of 2 aesthetascs this species resembles *Metis ignea* Philippi.

Antenna (fig. 99*a*) with short, stubby coxa and cylindrical allobasis, bearing 1 internal seta. No exopodite has been observed; total number of appendages on the endopodite is 7, 1 of which is a fine seta.

The oral parts are greatly reduced; the condition found in my preparation of these parts resembles the condition figured by Gurney (1927, figs. 166, 166 B) and Nicholls (1941a, fig. 5) so greatly that I need not repeat the description here. The seta on the appendage homologized by Gurney with the maxillipede has a much shorter apical seta than seems to have been the case in Gurney's figured specimen of *Metis ignea*.

Leg 1 (fig 99*b*) with 1-segmented, conical endopodite, and 3-segmented exopodite. Coxa big, with external coronula of spinules, basis with strong external and internal spine. Exopodal segments of nearly same length, 2nd without internal seta, 3rd with total of 4 appendages, increasing in size internally. Apex of endopodite does not reach jointing between 2nd and 3rd exopodal segments; there is a strong, internally curved spine at the middle of the internal margin, and a long apical spine. In the structure of leg 1, especially the endopodite, this specimen differs from the previously published descriptions of this form.

The details of legs 2 to 4 (figs. 99*c–e*) appear from the following notes and the setal formula:

	endopodite	*exopodite*
leg 2	0.1.220	0.1.122
leg 3	1.0.220	0.0.222
leg 4	1.0.220	0.0.222

Exopodites and endopodites of legs 2 to 4, 3-segmented.

Leg 2. External spine on basis duplicated, internal seta on basis near insertion of endopodite. Internal surface of 1st and 2nd endopodal segments haired (fig. 99*c*).

Leg 3. Internal seta on 1st endopodal segment short and strong (fig. 99*d*).

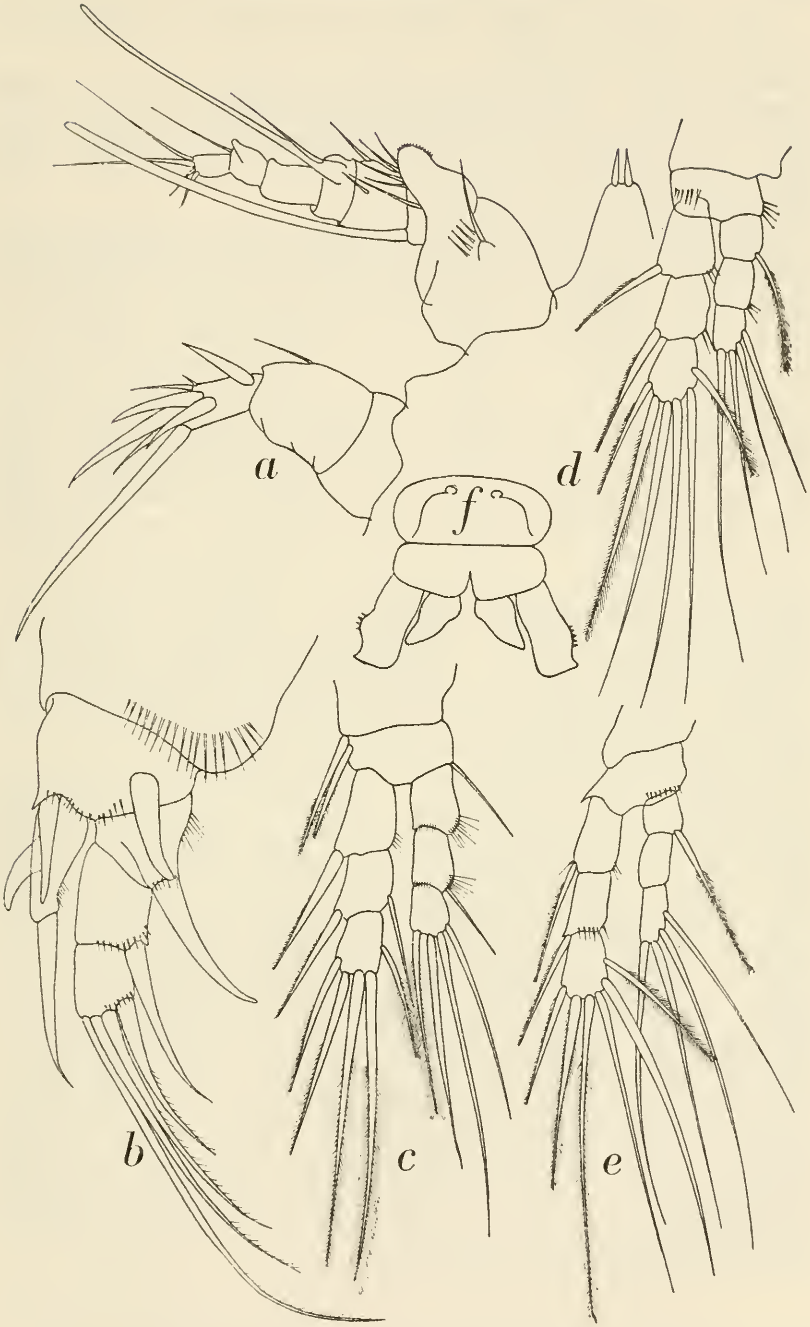

FIGURE 99.—*Metis holothuriae* (Edwards), loc. 592, ad. ♂: *a*, left antennule and antenna, with rostrum, in dorsal view (rostrum curved forward); *b*, leg 1; *c*, leg 2; *d*, leg 3; *e*, leg 4; *f*, 5th legs. (× 520.)

Leg 4. External margin of basis near insertion of exopodite produced into spine (fig. 99*e*).

Leg 5 of very characteristic appearance which can best be judged from figure 99*f*. Coxae and basis of left and right sides fused, exopodites and endopodites 1-segmented. Exopodites longer than endopodites, with external spinuous tubercle and apically produced into externally directed, blunt tooth.

REMARKS.—This is undoubtedly a male specimen of *Metis holothuriae*; the 1st segment of the endopodite may have become obscured by the large, fleshy basis of leg 1 in my preparation. The shape of leg 5 agrees particularly well with Nicholls' drawing (1941, fig. 4) of this appendage in the adult stage. There is a slight difference between the setal formulae given by Gurney (1927), Nicholls (1941), Lang (1948), and my specimen, on which the missing seta of the 2nd exopodal segment of leg 3 in my specimen is remarkable. This seta may have been removed during dissection, but the observation of the fine setae is obscured by the long hairs on the endopodal and exopodal segments.

Sewell (1940) split this species into two forms, differentiated by length and small structural differences (f. *minor*, ♀ 0.45 mm.; f. *major*, ♀ 0.82 mm., ♂ 0.68). In regard to the considerable differences in lengths of specimens from various localities and the great structural variability, I have not accepted Sewell's division and I have entered both forms in the synonymy of the nominal species.

The geographical distribution of this species has been discussed by Lang (1948, p. 778); it is known from the greater part of the northern and southern temperate, subtropical, and tropical Atlantic and appears to be well distributed throughout the tropical and subtropical Indo-Pacific area. The following Pacific localities have become known since the publication of Lang's monograph: Camorta Island and Nancowry Harbour in the Nicobar Islands, and Addu Atoll in the Maldive Archipelago (Sewell, 1940: measurements given above); Dongara, Port Denison, and Rottnest Island in Western Australia (Nicholls, 1941a, 1942a, 1945: ♀ up to 0.84 mm., ♂ up to 0.825 mm.); and Sellick Reef in Southern Australia (Nicholls, 1941). The species, or at least the developmental stages, preferably live on algae; isolated specimens also have been recorded from plankton hauls, from sandy and muddy bottoms, from holothurians, etc. The present specimen was obtained from a sand sample taken some 340 feet from the reef margin at Falarik in the Ifaluk Atoll.

Family Ameiridae Monard, 1927

Genus *Ameira* Boeck, 1864

Ameira longipes Boeck, 1864

FIGURES 100–102

Ameira longipes Boeck, 1864, p. 273.—Marine Biological Association, 1931, p. 165.—Nicholls, 1939, p. 271.—Monk, 1941, p. 98, pl. 2 (figs. 12, 13).—Lang, 1944, p. 24; 1948, p. 788, figs. 316 (no. 1), 317 (no. 1).—Klie, 1950, p. 88.—Noodt, 1955, p. 771.—Marine Biological Association, 1957, p. 169.—Roe, 1958, pp. 230, 250, fig. 130.—Wieser, 1959, pp. 107–110.

MATERIAL.—Loc. 590, ad. ♂, 0.33 mm. Loc. 594, 1 ad. ♀, 0.41 mm. Loc. 638, 1 ad. ♀, 0.36 mm.; 2 ad. ♂♂, 0.35 and 0.37 mm.

DESCRIPTION.—The female specimen from locality 594 and the male from locality 590 have been completely described, dissected, and mounted.

Adult female, total length 0.41 mm.; greatest diameter 0.12 mm.; length of longest furcal seta 0.26 mm.

General shape of body in dorsal aspect fairly slender, with cephalothorax and abdomen well separated (fig. 100*a*). Cephalothorax ovate, abdomen elongate; thoracic portion in lateral view considerably curved, whole back and head curved and rounding into small rostrum, which is almost invisible from the side since it is obscured completely by antennules (fig. 100*b*). Rostrum in dorsal view visible as minor, rounded protuberance in front of head. Head and 1st thoracic somite fused to form cephalic somite, slightly longer than combined lengths of thoracic somites 2 and 3. Greatest diameter of body at end of cephalic somite, anteriorly narrowing rapidly, posteriorly narrowing very little until 4th thoracic somite is reached. Sides of cephalic somite moderately produced, epimeral plates of thoracic somites 2–4 rounded.

5th thoracic somite prominent both in lateral and dorsal view; genital somite with distinct line of fusion between somites 1 and 2. Length of genital somite equal to combined lengths of somites 3 to 4; these last somites have about same length. Anal somite longer than preceding somite, about as long as wide, with narrowly rounded anal plate. Rami of furca (fig. 101*f*) widely separated, parallel, slightly wider than long (width 18μ, length 14μ). Each furcal ramus with 5 marginal setae and 1 appendicular seta. Setae 1, 4, and 5 fine and short, appendicular seta slightly longer. Setae 2 and 3 lengthened and thickened, especially 2nd, which reaches more than half body length. No spinules on cephalic or abdominal somites, nor on furca.

Antennules 8-segmented, reaching end of cephalic somite.

Antenna with basis and endopodite separate. Exopodite short, 1-segmented, with 3 setae and short spine. Mandibular palp absent.

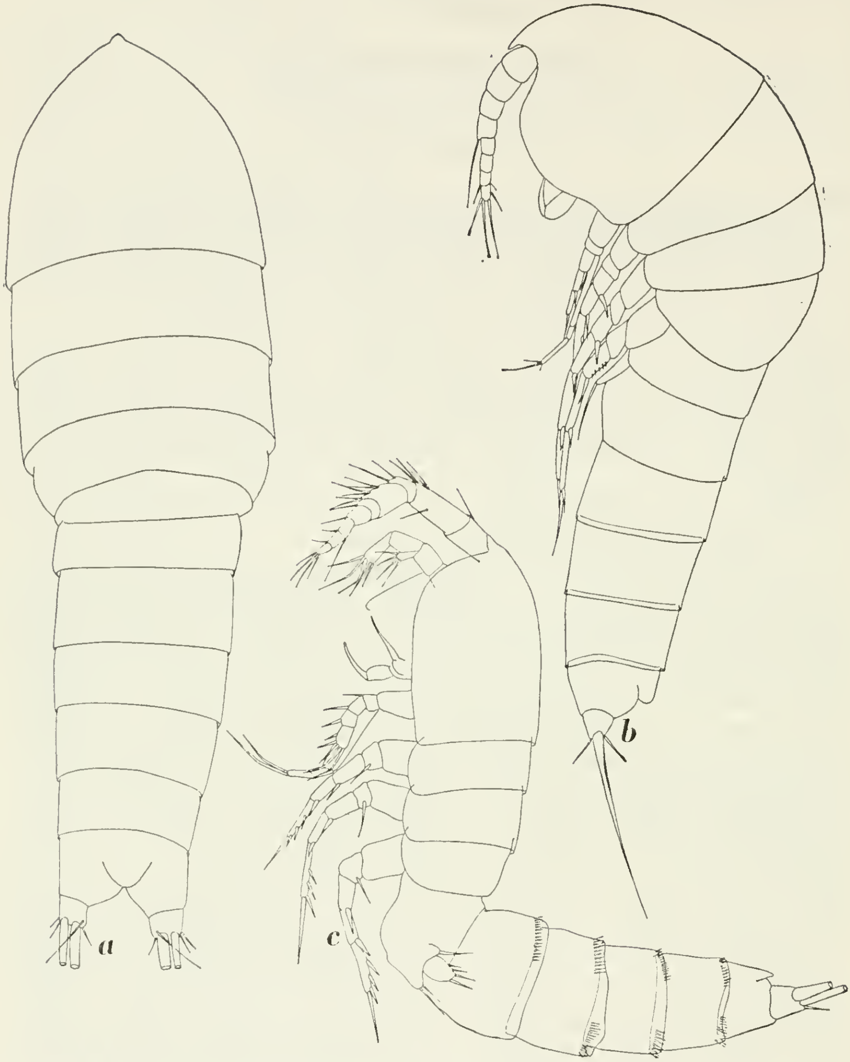

FIGURE 100.—*Ameira longipes* Boeck, loc. 594, ad. ♀: *a*, whole animal, dorsal view; *b*, same animal, lateral view from left side; loc. 590, ad. ♂: *c*, whole animal, lateral view from left side. (× 275.)

Dissection of oral appendages and leg 1 partly unsuccessful; these parts are not described in detail here.

Leg 1 (fig. 101*a*) with 3-segmented exopodite, without setae on internal margin of segments 1 and 2, 3rd segment with a total of 5 appendages. 1st endopodal segment styliform, longer than whole exopodite. 2nd endopodal segment small, 3rd endopodal segment 4

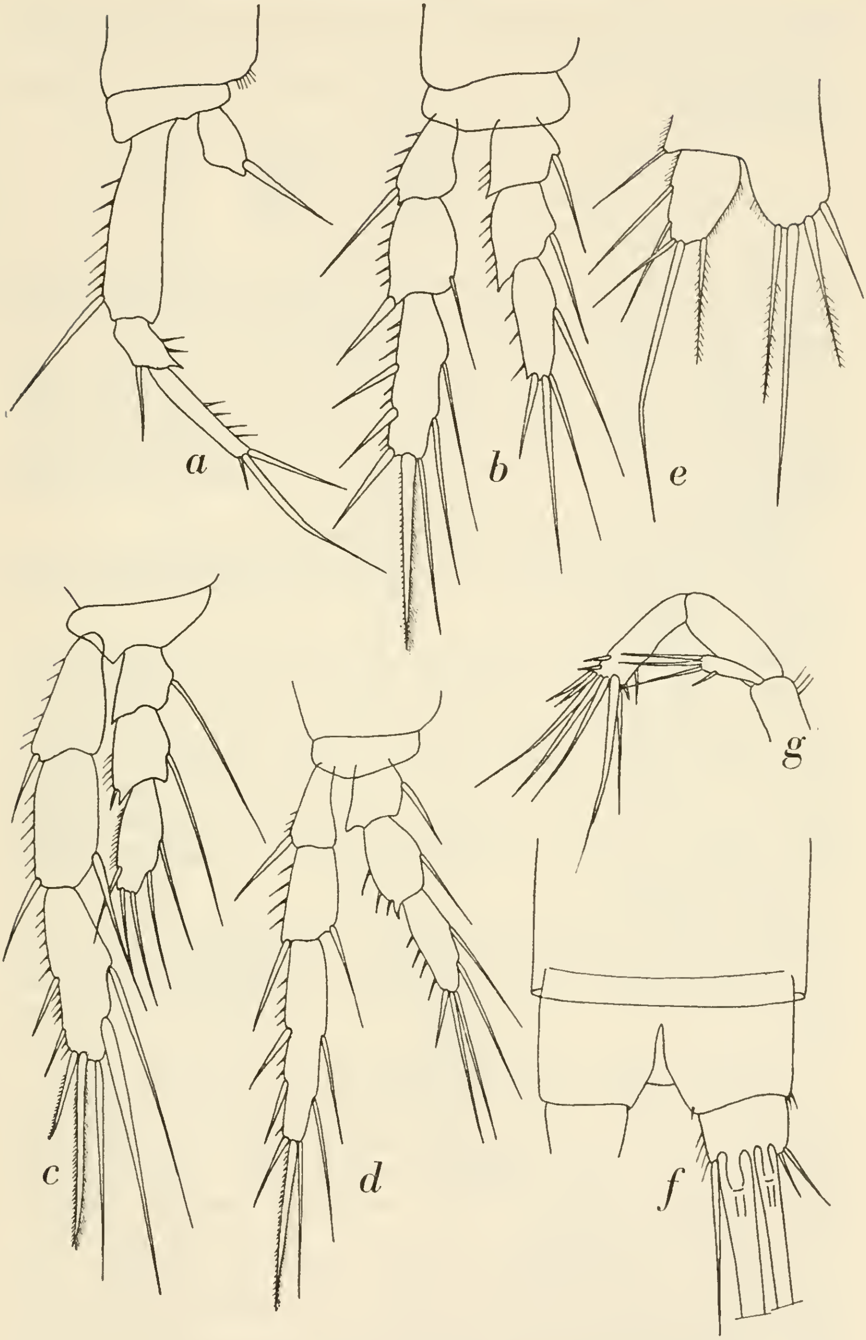

FIGURE 101.—*Ameira longipes* Boeck, loc. 594, ad. ♀: *a*, leg 1, part of exopodite missing; *b*, leg 2; *c*, leg 3; *d*, leg 4; *e*, leg 5; loc. 590, ad. ♂: *f*, distal part of abdomen and furca, ventral view; *g*, antenna. (× 625.)

times as long as wide, twice as long as 2nd segment, with 2 geniculate setae and 1 fine seta.

The details of legs 2 to 4 appear from figures 101*b–d* and the setal formula:

	endopodite	*exopodite*
leg 2	1.1.121	0.1.223
leg 3	1.1.221	0.1.223
leg 4	1.1.221	0.1.223

Leg 3 (fig. 101*c*) with short endopodite, reaching slightly beyond jointing of exopodal segments 2 and 3. Endopodite of legs 2 and 4 longer, apex reaching middle of 3rd exopodal segment.

Exopodite of leg 5, 1½ times as long as broad, more or less cordate, but attached to baso-endopodite by means of broad strip, with total of 5 setae, one of which is lengthened. Baso-endopodite squarish, slightly shorter than exopodite, with 4 setae, one of which is lengthened (fig. 101*e*).

Color completely faded, transparently yellowish.

Adult male (loc. 590), total length 0.33 mm.; length of longest furcal seta 0.30 mm. The specimen could not be figured dorsally because of strongly curved body.

General shape of body slenderer than in female, particularly cephalothorax, with the result that demarcation between cephalothoracic and abdominal parts of body is obscured. Head and 1st thoracic somite fused to form cephalic somite, which is as long as combined lengths of thoracic somites 2 to 4. Line of back very moderately curved, rostrum as small as in female, ⅓ length of 1st antennular segment. Sides of cephalic somite scarcely produced, oral field conically protruding (fig. 100*c*).

Abdomen with 1st and 2nd segments separate, somites 1 to 4 and anal somite have about same length. 1st abdominal somite with dorsolateral spinules; 2nd to 4th somites with dorsolateral and ventrolateral spinules; anal operculum nude, internal furcal margin haired.

Setation of furca as in female; setae 2 and 3 not swollen basally.

Antennules haplocerate, hinge developed between 5th and 6th segments. 2nd segment long, 4rd segment swollen, big, with small conical process carrying aesthetasc and 2 setae. Apical segment small, indistinctly separated from penultimate segment. Setation represented in figure 102*g*.

Antenna with basis and endopodite separate, exopodite small, unsegmented, with 3 setae and a spine. Endopodite with 7 apical appendages and some spinules (fig. 101*g*).

Leg 1 (fig. 102*a*) with strong internal spine at basis, externally with seta. Exopodites and endopodites 3-segmented. Exopodal segments

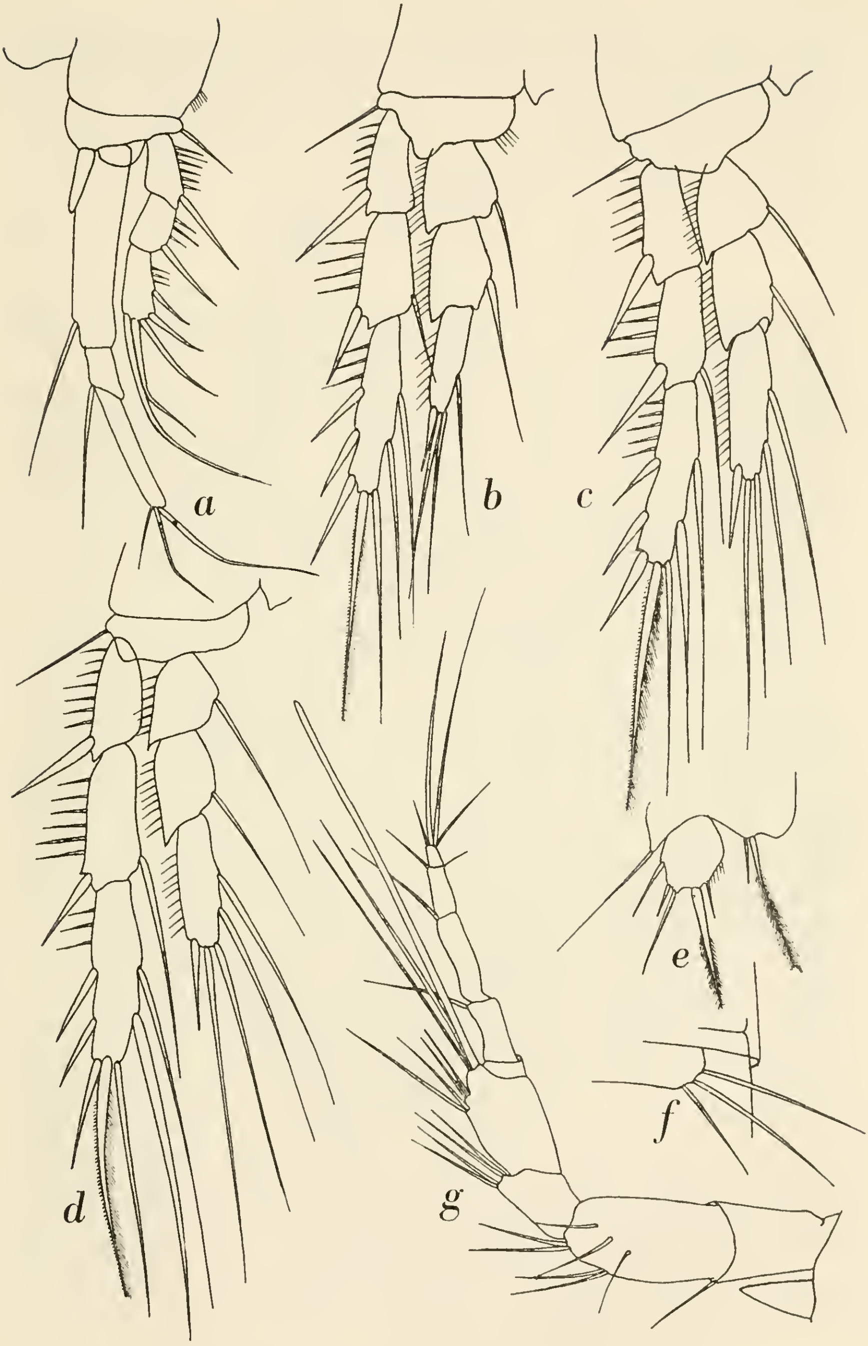

FIGURE 102.—*Ameira longipes* Boeck, loc. 590, ad. ♂: *a*, leg 1; *b*, leg 2; *c*, leg 3; *d*, leg 4; *e*, leg 5; *f*, leg 6; *g*, antennule. (× 625.)

of nearly same length; 2nd without internal seta, 3rd with total of 5 appendages. 1st endopodal segment styliform, longer than exopodite. 2nd segment small, 3rd long, 5 times as long as wide, twice as long as 2nd segment, with two geniculate setae and 1 fine seta.

Legs 2 to 4 with 3-segmented exopodites and endopodites (figs. 102*b–d*) and the following setal formula:

	endopodite	*exopodite*
leg 2	1.1.121	0.1.223
leg 3	1.1.221	0.1.223
leg 4	1.1.221	0.1.223

Endopodites of legs 2 to 4 normally developed, reaching insertion of proximal internal seta on 3rd exopodal segment.

Exopodite of leg 5 (fig. 102*e*) small, with total of 5 setae, one of which stronger than rest. Baso-endopodite short, ⅓ length of exopodite, with 2 setae, median seta strong. A more median internal seta has probably been present and was removed by dissection. Genital plates (leg 6) armed with 3 strong setae (fig. 102*f*).

Remarks.—I have little doubt that the female described above is *Ameira longipes* though few Pacific records are available. *A. scotti* G. O. Sars, 1911, is allied closely to the present species; the male of *A. scotti*, which is still undescribed, probably will resemble the male of *A. longipes* in many details. The females of both species are differentiated mainly by the length of the endopodites, particularly that of leg 3, and small details of length of setae of leg 5. The length of the endopodites in the present male specimen is as in *A. longipes*; the fairly long antennules suggest *A. scotti*. The length of the endopodites, the structure of leg 5, and the presence of an additional female induced me to record the specimen as *Ameira longipes* Boeck.

The geographical distribution of this species has been discussed by Lang (1948, p. 788). To the given localities can be added: the Helgoland area of Germany (Klie, 1950); the Dalkey area of County Dublin, Ireland (Roe, 1958); the Plymouth area of England (Marine Biological Association, 1931, 1957); and two Pacific records, the Puget Sound beaches (Wieser, 1959) and La Jolla, California (Monk, 1941), in the United States. The species has its main area of distribution in the northern and temperate Atlantic Ocean; it has been found also in the Mediterranean and, sparingly, in the eastern Pacific. In the Ifaluk collection, specimens occur in two sand samples taken at various distances from the reef margin and in samples from crevices near the seaward reef margin. The Ifaluk specimens are much smaller than the Atlantic specimens (♀ 0.75 mm.); the females recorded by Monk (1941) measured 0.77 mm.

Ameira minuta Boeck, 1864

FIGURES 103, 104

Ameira minuta Boeck, 1864, p. 273.—Fraser, 1936, p. 26.—Nicholls, 1939, p. 271.—Lang, 1948, p. 789, figs. 316 (no. 2), 317 (no. 2).—Klie, 1950, p. 88.—Roe, 1958, p. 230.

MATERIAL.—Loc. 431, 1 ov. ♀, 0.35 mm. Loc. 589, 3 ov. ♀♀, 0.33, 0.35, 0.36 mm. Loc. 638, 1 ad. ♀, 0.30 mm.

DESCRIPTION.—The following is based on the female specimen of 0.35 mm. length from locality 589.

Adult female, total length 0.35 mm.; greatest diameter 0.11 mm.; length of longest furcal seta 0.25 mm.

General shape of body slender, without sharp demarcation between cephalothorax and abdomen, which have nearly same length (proportion 12:11). Cephalothorax with very slightly curved, almost parallel walls, anterior part rounded, deeply incised at insertion of antennules; rostrum distinctly visible in dorsal view as small, triangular projection between antennular bases, as long as 1st antennular segment (fig. 103*b*). Head and 1st thoracic somite fused, cephalic somite slightly longer than combined lengths of thoracic somites 2 to 4; back smoothly curving into rostrum, sides produced to cover basal parts of oral appendages (fig. 103*a*). Rostrum with fairly thick base, pointing obliquely forward. Epimeral plates of thoracic somites 2 and 3 cut off squarely; extreme lateral apex of 4th somite rounded.

Thoracic somite 5 small, visible as narrow band in dorsal and lateral aspects. Genital somite composed of fused abdominal somites 1 and 2, line of fusion distinctly visible dorsally and ventrally, as long as combined lengths of abdominal somites 3 and 4, which have same length. Completely closed row of spinules along distal end of genital and 3rd abdominal somites. Some spinules on lateral surface of somite 1 near line of fusion. Anal somite longer than preceding somite, with broad, nude anal plate. Insertion of widely separated furcal rami bordered with spinules; some additional spinules on sides.

Furcal rami slightly broader than long (proportion 5:4), with 5 marginal setae and 1 appendicular seta. Appendicular seta and setae 1, 4, and 5 fine but fairly long; setae 2 and 3 lengthened and thickened, especially the 2nd. Both setae slightly swollen at base. Distal end of caudal rami cut off obliquely.

Antennules slightly shorter than cephalic somite, 8-segmented; 2nd segment long, 4th with conical process bearing aesthetasc and 2 setae; process covers nearly whole of segment 5. Setation represented in figure 104*f*.

Basis and 1st endopodal segment of antenna separate. Exopodite small, 1-segmented, with 3 long setae and 1 spine. Endopodite with 8 appendages, 4 of which are geniculate setae (fig. 104*g*).

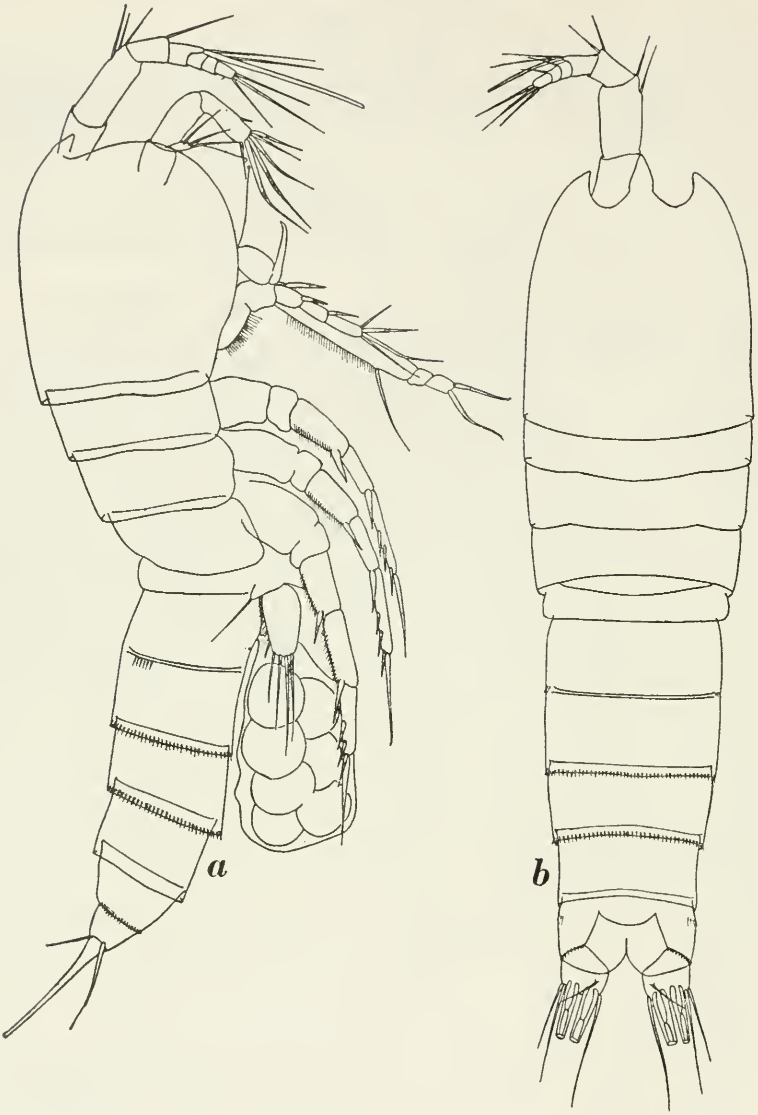

FIGURE 103.—*Ameira minuta* Boeck, loc. 589, ad. ♀: *a*, whole animal, lateral view from right side; *b*, same animal, dorsal view. (× 310.)

Mandibular praecoxa produced into slender cutting edge, bearing 4 teeth and a seta. Palp very small, basipodite short, with 1 strong and 2 very thin, scarcely observable setae. Endopodite unsegmented, with 3 long setae and 1 short seta (fig. 104*h*).

Maxillule damaged in my dissection.

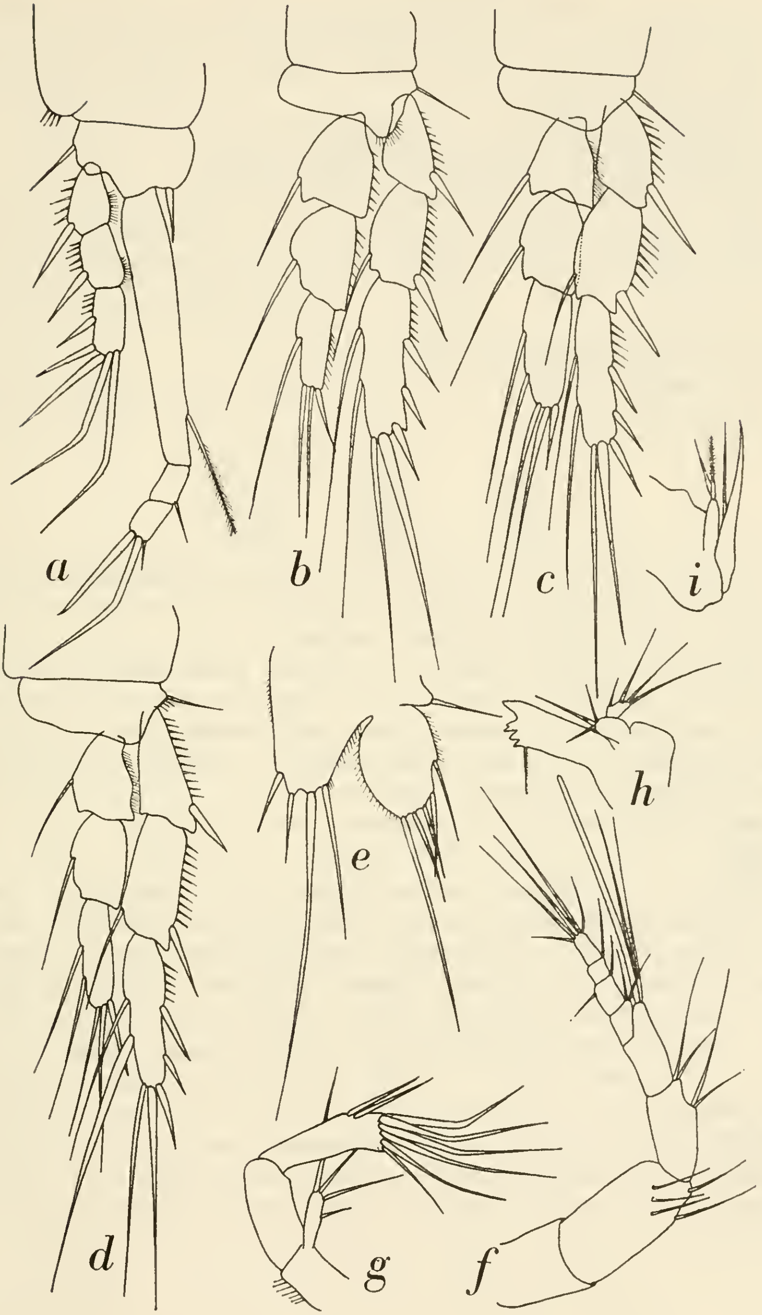

FIGURE 104.—*Ameira minuta* Boeck, loc. 589, ad. ♀: *a*, leg 1; *b*, leg 2; *c*, leg 3; *d*, leg 4; *e*, leg 5; *f*, antennule; *g*, antenna; *h*, mandible; *i*, maxilla. (× 520.)

Maxilla (fig. 104*i*) with indication of praecoxal endite without setae. Coxal endite small, elongate, with 2 setae. Basal endite better developed, coalescent with strong, curved spine, in addition bearing fine seta. No endopodite.

Maxillipede chelate, with moderately swollen basis and 1-segmented endopodite, forming curved digit, as long as basis.

Leg 1 (fig. 104*a*) different from that in *A. longipes* by better development of basis, which has fine internal spine. Exopodite as in that species, reaching slightly beyond middle of 1st endopodal segment. 1st endopodal segment styliform, seta some distance from apex of internal margin. 2nd and 3rd endopodal segments of equal length; 3rd with 2 geniculate setae and 1 fine seta.

The details of legs 2 to 4 appear from figures 104*b–d* and the setal formula:

	endopodite	*exopodite*
leg 2	1.1.121	0.1.223
leg 3	1.1.221	0.1.223
leg 4	1.1.221	0.1.223

Endopodites of legs 2 and 3 well developed, reaching insertion of distal internal seta of 3rd exopodal segment, that of leg 4 slightly shorter, reaching insertion of proximal seta.

Exopodite of leg 5 broadly ovate, 1½ times as long as wide, attached to baso-endopodite with narrow strip. Internal border convex, spinous. Five marginal setae; innermost seta lengthened. Baso-endopodite reaching halfway along exopodite, apex cut off squarely, with 4 setae, one of which is lengthened.

Color faded, transparently yellowish. Female carries a sac with 8 eggs.

REMARKS.—*Ameira minuta* has its main area of distribution in the North Atlantic: the Atlantic coast of Norway (Boeck, 1864; Sars, 1906); the Skagerrak coast of Sweden (Lang, 1936, 1948); the Helgoland area of Germany (Klie, 1927, 1950); the Firth of Forth, Scotland (T. Scott, 1903, 1905); Blacksod Bay of County Mayo, Ireland (Farran, 1913); and the Dalkey area of County Dublin, Ireland (Roe, 1958). The present record seems to be the first from the Pacific area; the specimens are smaller than those recorded from the Atlantic (♀ 0.56–0.64 mm.). In the Ifaluk collection it occurs in washings of algae, in a sand sample, and in crevices along the reef edge. In the North Atlantic also, the species has been recorded from a variety of substrata.

Ameira parvula (Claus, 1866)

Figures 105*a*,*b*, 106*a–f*

Canthocamptus parvulus Claus, 1866, p. 30, pl. 5 (figs. 1–6).

Ameira parvula.—Vàtova, 1928, p. 183.—Nicholls, 1939, pp. 271, 272.—Sewell, 1940, pp. 300, 301, 352, 359, 366, 369, 371, 372, 373, 375.—Nicholls, 1941b, p. 85.—de Vos, 1945, p. 77, figs. 79, 80.—Lang, 1948, p. 790, figs. 316 (no. 3), 317 (no. 3).—Klie, 1950, p. 88, fig. 8.—Caspers, 1951, p. 65.—Ax, 1952, p. 239.—Gallingani, 1952, p. 75.—Noodt, 1952, p. 109.—Božić, 1955, p. 8, pl. 4 (figs. 1–6).—Noodt, 1955, p. 78; 1955a, p. 207.—Schütz and Kinne, 1956, p. 113.—Maghraby and Perkins, 1956, p. 492.—Băcesco, et al., 1957, p. 345, fig. 13h.—Noodt, 1957, p. 153.—Stock and de Vos, 1960, p. 206.—Marcus and Pór, 1961, pp. 124, 125.

Material.—Loc. 591, 4 ad. ♀♀, 0.39–0.43 mm. (0.41 mm.).

Description.—The following is based on a female specimen of 0.39 mm. length, which has been dissected and mounted.

Adult female, total length 0.39 mm.; greatest diameter 0.10 mm.; length of longest furcal seta 0.37 mm.

General shape of body greatly resembling condition observed in *Ameira minuta*; cephalothorax, however, narrows very gradually anteriorly and, consequently, is more or less spindle-shaped (fig. 105*b*). Greatest diameter of body at end of cephalic somite; cephalothorax and abdomen indistinctly separate. Head and 1st thoracic somite completely fused to form cephalic somite, which is as long as combined lengths of thoracic somites 2 to 4; sides moderately produced to shield basal parts of oral appendages; extreme lateral apex rounded (fig. 105*a*). Back almost straight, rostrum small, frontal part of head only slightly incised at insertion of antennules. Rostrum a triangular protrusion, half length of 1st antennular segment, pointing obliquely downward. Epimeral plates of thoracic somites 2 to 4 cut off squarely. There are several internal chitinous ridges on the cephalothorax, serving, apparently, as places of attachment for muscles. There is a pair of short, transversal ridges at the level of the oral aperture left and right of the middorsal line on the cephalic somite, and some chitinized tubercles along the distal edge of the cephalic somite. Transversal ridges also occur on the 3rd and 4th thoracic somites, left and right of the middorsal line.

5th thoracic somite distinctly visible, short. Genital somite composed of fused 1st and 2nd abdominal somites, slightly longer than combined lengths of somites 3 and 4, which have about same length. There is a distinct line of fusion on the genital somite. Spinules occur on the laterodorsal and lateroventral sides of the 1st (near line of fusion), the 2nd, and the 3rd somites; the 4th is nude. Anal somite as long as 4th, with laterally some spinules. Anal flap broadly rounded, nude. Insertion of furcal rami without spinules.

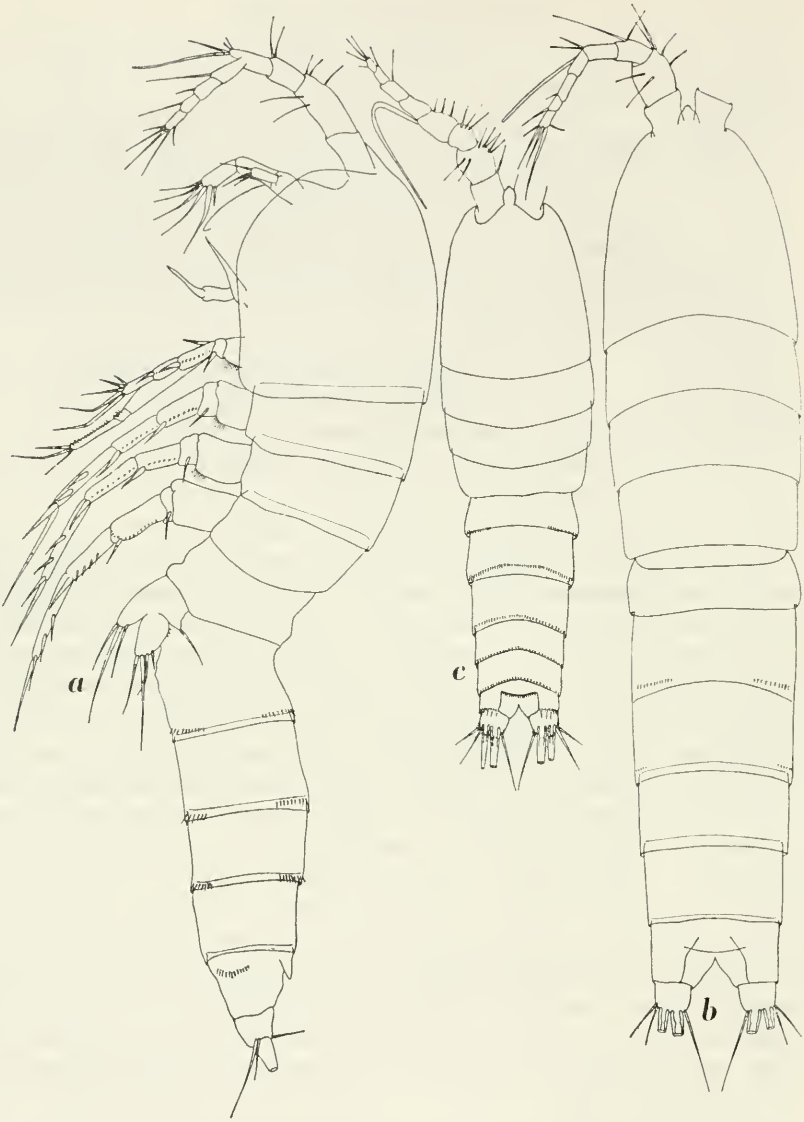

FIGURE 105.—*Ameira parvula* (Claus), loc. 591, ad. ♀: *a*, whole animal, lateral view from left side; *b*, same animal, dorsal view. *Nitocra affinis* Gurney, loc. 591, ad. ♂: *c*, whole animal, dorsal view. (*a*, *b*, × 275; *c*, × 62.)

Furcal rami as long as broad, with 5 marginal setae and 1 appendicular seta. Development of setae as in *A. minuta*.

Antennules 8-segmented, short, slightly shorter than length of cephalic somite. Setation and length of segments visible in figure 106*e*;

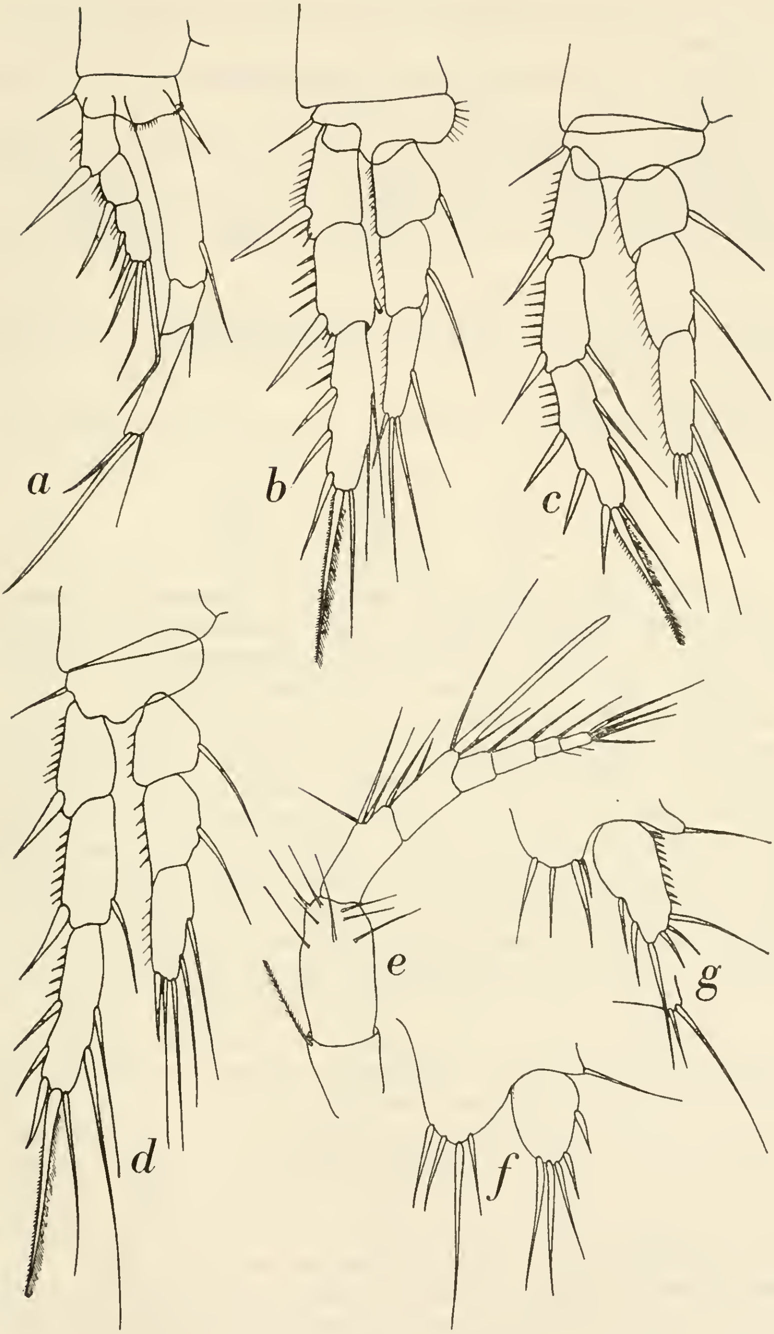

FIGURE 106.—*Ameira parvula* (Claus): *a*, leg 1; *b*, leg 2; *c*, leg 3; *d*, leg 4; *e*, antennule; *f*, leg 5. *Nitocra affinis* Gurney, loc. 591, ad. ♂: *g*, legs 5 and 6. (× 520.)

conical process on 4th segment small; only 1 seta that accompanies aesthetasc.

Basis and 1st endopodal segment of antenna separate. Exopodite 1-segmented, with 3 setae and small spine.

Mandible as in previous species, but with 2 setae on basipodite, and 4 setae on styliform endopodite.

Maxillule, maxilla, and maxillipede as figured and described by Giesbrecht (1882, p. 117, as *Ameira tau*), Sars (1907, p. 218) and Lang (1948, p. 790).

Leg 1 (fig. 106*a*) almost as in *A. longipes;* exopodite 3-segmented, 2nd exopodal segment small, 3rd with 5 appendages. 1st endopodal segment slightly longer than exopodite, 3rd endopodal segment twice length of segment 2.

The details of legs 2 to 4 can be taken from figures 106*b–d* and the setal formula:

	endopodite	*exopodite*
leg 2	1.1.121	0.1.223
leg 3	1.1.221	0.1.223
leg 4	1.1.221	0.1.223

Leg 5 (fig. 106*f*) with more or less cordate exopodite, fastened to baso-endopodite with fairly broad strip. Exopodite with 5 marginal setae, median 2 setae lengthened. Baso-endopodite half length of exopodite, with 4 setae, one of which is lengthened.

REMARKS.—The description given above agrees with the typical form of this well-distributed and variable species. The geographical distribution is discussed by Lang (1948, p. 792). The following records are from the literature which has appeared since Lang's paper: the Gulf of St. Lawrence in Canada (Nicholls, 1939); the Helgoland area of Germany (Klie, 1950); Kiel Firth in Germany (Schütz and Kinne, 1955); oyster beds near Yerseke in the Netherlands (de Vos, 1945); the estuary of the Ems River in Germany (Stock and de Vos, 1960); Roscoff, France, on the English Channel (Božić, 1955); Teneriffe in the Canary Islands (Noodt, 1955a); Whitstable in County Kent on the English Channel coast (Maghraby and Perkins, 1956); from Posidonia pastures near Portofino in Liguria, Italy (Gallingani, 1952); Stalin Gulf, Bulgaria, on the Black Sea (Caspers, 1951); Lake Tuzla in Turkey and the Black Sea coast of Rumania (Marcus and Pór, 1961); Odessa Gulf on the Black Sea (Băcesco, et al., 1957); and the Sea of Marmara off Turkey (Noodt, 1955). No Pacific records appear to be available; this is the first record from that area. In the Ifaluk collection some specimens occur in a sand sample, taken some 120 feet from the reef margin at Falarik in the Ifaluk Atoll. In the North Atlantic area the species has been found in a variety of substrata and under widely different conditions of temperature and salinity.

Genus *Nitocra* Boeck, 1864

Nitocra affinis Gurney, 1927

Figures 105*c*, 106*g*, 107–109

Nitocra affinis Gurney, 1927, pp. 545, 546, fig. 154.—Willey, 1930, p. 93.—Gurney, 1932, p. 54.—Lang, 1935, p. 6.—Chappuis, 1938, pp. 155, 159.—Sewell, 1940, pp. 359, 369.—Lang, 1948, p. 820, fig. 328 (no. 1).—Humes, 1953, p. 366.—Petkovski, 1954, pp. 106, 111, figs. 57–60.—Roe, 1958, pp. 230, 250, figs. 131–136.

Material.—Loc. 589, 1 ad. ♀, damaged, not measured; 1 ad. ♂, 0.42 mm. Loc. 590, 2 ad. ♀♀, 0.43–0.45 mm.; 1 ad. ♂, 0.42 mm. Loc. 591, 5 ad. ♂♂, 0.42–0.50 mm. (0.46 mm.). Loc. 592, 2 ad. ♀♀, 0.47 and 0.56 mm.

Description.—The following is based on a female specimen of 0.56 mm. length from locality 592 and a male of 0.42 mm. from locality 591.

Adult female (loc. 592), 0.56 mm.; greatest diameter 0.14 mm.; length of longest furcal seta 0.39 mm.

General shape of body slender, with greatest diameter at end of cephalic somite, rounded anteriorly and very gradually narrowing posteriorly. Cephalothorax and abdomen of nearly same length (proportion 11:10), distinctly separated by ring-shaped constriction; all thoracic and abdominal somites stand out fairly distinctly by more shallow constrictions of same character (fig. 107*a*). Head and 1st thoracic somite fused to form cephalic somite, which is slightly longer than combined lengths of thoracic somites 2 to 3. Back in lateral aspect moderately curved, running into small, forwardly directed rostrum (fig. 107*b*). Rostrum small, placed between two depressions at insertion of antennules, conical, with rounded apex, half length of 1st antennular segment. Sides of cephalic somites slightly produced and broadly rounded to shield basal parts of oral appendages. Epimeral plates of 2nd and 3rd thoracic somites rounded; of 4th somite, cut off squarely.

5th thoracic somite very distinct in lateral and dorsal aspects, with dorsolateral row of spinules on both sides. Genital somite composed of two almost completely separated somites; separation is marked further by almost completely closed row of spinules at distal end of 1st abdominal somite (interrupted only ventrally). Such a row of spinules also occurs on 2nd to 4th abdominal somites. The 1st to 4th abdominal somites have, on each side, an additional oblique row of spinules, the position of which appears from figures 107*a*,*b*. Somites 1, 3, and 4 of nearly equal length, somite 2 slightly longer.

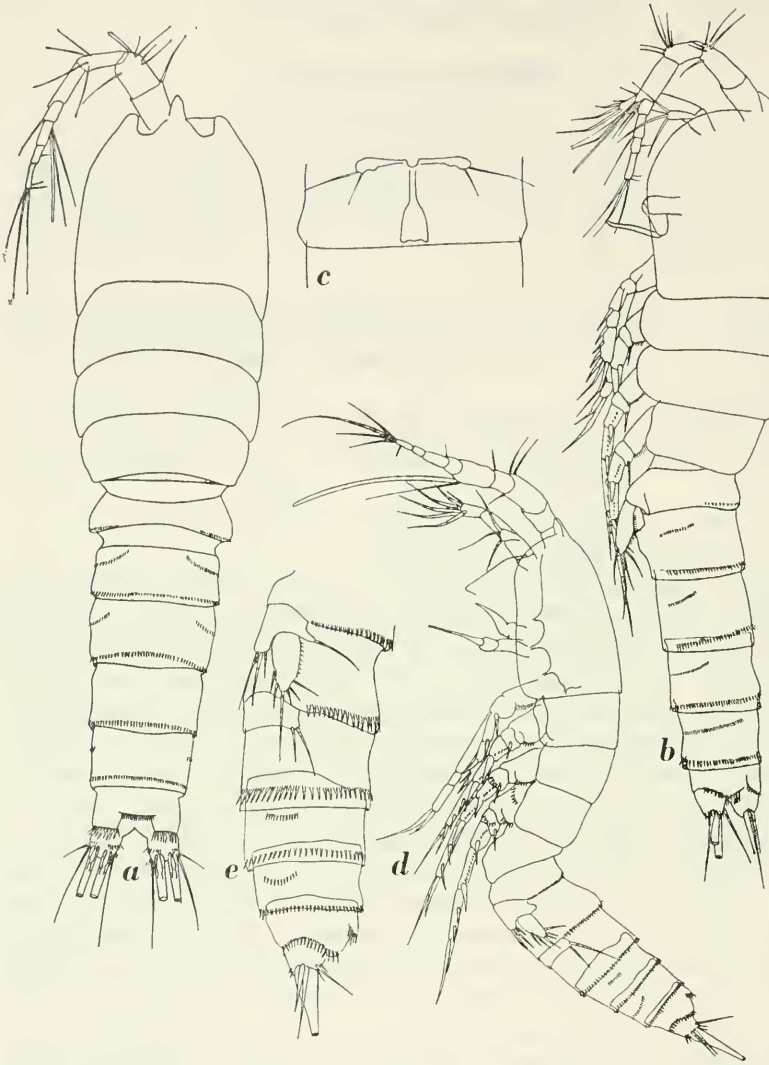

FIGURE 107.—*Nitocra affinis* Gurney, loc. 592, ad. ♀: *a*, whole animal, dorsal view; *b*, same animal, lateral view from left side; *c*, genital somite, ventral view; loc. 591, ad. ♂: *d*, whole animal, lateral view from left side; *e*, abdomen, lateral view from left side. (*a–d*, × 165; *e* × 275.)

Anal somite shorter than preceding somite, anal flap almost straight, set with spinules. Spinules also border insertion of furcal rami. Anal somite deeply cleft between furcal insertions; cleft part of anal somite haired.

Furcal rami distinctly broader than long (proportion 3:2), with 5 marginal setae and 1 appendicular seta. There are two short, transversal rows of spinules. Appendicular seta, setae 1, 4, and 5 fine and short. Setae 2 and 3 lengthened and thickened, especially 2nd, which reaches ⅔ body length; seta 3 much shorter. Lengthened setae not swollen at base.

Antennules (fig. 108*a*) slender, longer than cephalic somite, 8-segmented. Segments 1 and 2 slightly swollen, 4th segment 3 times as long as wide, with small conical process bearing aesthetasc and 2 setae. Setation represented in figure 108*a*.

Antenna (fig. 108*b*) with basis and endopodal segment separate; exopodite unsegmented, with 3 marginal setae. Endopodite with 7 setae, 4 of which are geniculate. Spine at external margin of endopodite.

Mandible with elongated praecoxa and small cutting edge; number of teeth could not be counted. Basipodite fairly big, with single strong seta. No exopodite; endopodite unsegmented and small, carries 4 marginal setae (fig. 108*c*).

No suitable preparation of the maxillule was obtained.

Maxilla (fig. 108*d*) with small praecoxal and small coxal endite, each carrying 2 setae. Basal endite stronger, coalescent with strong curved spine. In addition, there is a fine seta on the basal endite.

Maxillipede (fig. 108*e*) chelate, with small coxa and moderately swollen basis. No setae or spinules on coxa and basis. Endopodite represented by single, claw-shaped digit, tapering into fine point, longer than basis.

Coxa of leg 1 (fig. 108*f*) with haired external tubercle. Basis with internal and external strong tubercle, in addition to some spinules. Endopodite and exopodite 3-segmented. 3 exopodal segments of about equal length; 2nd with internal seta, 3rd with total of 5 appendages, 2 of which are geniculate setae. 1st endopodal segment styliform, longer than whole exopodite, 4½ times as long as broad, with seta at ⅔ of internal margin, 2nd and 3rd endopodal segments of about equal length, both with fine internal seta. In addition, there are 2 geniculate setae at apex of segment 3.

The details of legs 2 to 4 follow from figures 108*g–i* and from the setal formula:

	endopodite	*exopodite*
leg 2	1.1.121	0.1.223
leg 3	1.1.221	0.1.223
leg 4	1.1.221	0.1.323

Legs 2 to 4 with 3-segmented exopodites and endopodites. 2nd exopodal segment with haired, 1st with spinulose, external margin. Leg 4 more strongly developed than leg 2 or 3, especially exopodite. Median internal seta of 3rd exopodal segment of leg 4 strongly developed; endopodite reaches slightly beyond articulation between 2nd and 3rd exopodal segments.

Exopodite of leg 5 twice as long as broad, ovate; external and internal walls parallel. 6 marginal setae, distribution of which can best be judged from figure 108*j*. Baso-endopodite short, reaching half length of exopodite, with 5 setae. External lobe small, with fine, nude seta.

Color transparently greenish, with globular, green granules at several places in the body. There is a pair of cuticular lenses or chitinized thickenings just behind the base of the rostrum that may represent a paired visual organ.

Adult male (loc. 591), 0.42. mm.; greatest diameter 0.11 mm.; length of longest furcal seta 0.23 mm.

General shape of body almost as in female, but slenderer, with division between cephalothorax and abdomen distinctly marked; various thoracic and abdominal somites stand out less clearly than in female, because circular constrictions are not present (fig. 105*c*). Head and 1st thoracic somite fused, cephalic somite as long as combined lengths of thoracic somites 2 to 4. Back very little curved, rostrum smaller than in female, ⅓ length of 1st antennular segment, shape as in female (fig. 107*d*). Sides of cephalic somite less produced, with the result that basal parts of oral appendages are distinctly visible. Epimeral plates of thoracic somites 2 to 4 scarcely produced, cut off squarely.

5th thoracic somite distinctly visible dorsally and laterally, on each side with laterodorsal row of spinules. 1st and 2nd abdominal somites separate, of equal length. 3rd and 4th thoracic somites of equal length, each shorter than 1 or 2. Somites 1 to 4 with completely encircling distal row of spinules, which on 1st somite ventrally interrupted by genital plates that are distinctly visible laterally (fig. 107*e*). Anal somite slightly shorter than 4th somite; anal plate distinct, broadly rounded and fringed with spinules. Insertion of furcal rami also bordered by strong spinules. Furca as in female, development of setae also identical in sexes.

Antennules (fig. 109*a*) about as long as cephalic somite, subchirocerate, 8-segmented, hinge developed between 5th and 6th segments. 4th segment moderately swollen at its base with patch of short setae; conical process well developed. Apical portion of 4th segment more or less set off from segment 4, giving impression of separate segment, with pectiniform row of hairs. Setation represented in figure 109*a*.

2nd antenna and oral appendages as in female, not described in detail here. Legs 1 to 4 as in female, internal spine on 1st endopodal segment of leg 1 stronger and plumose (figs. 109–*be*).

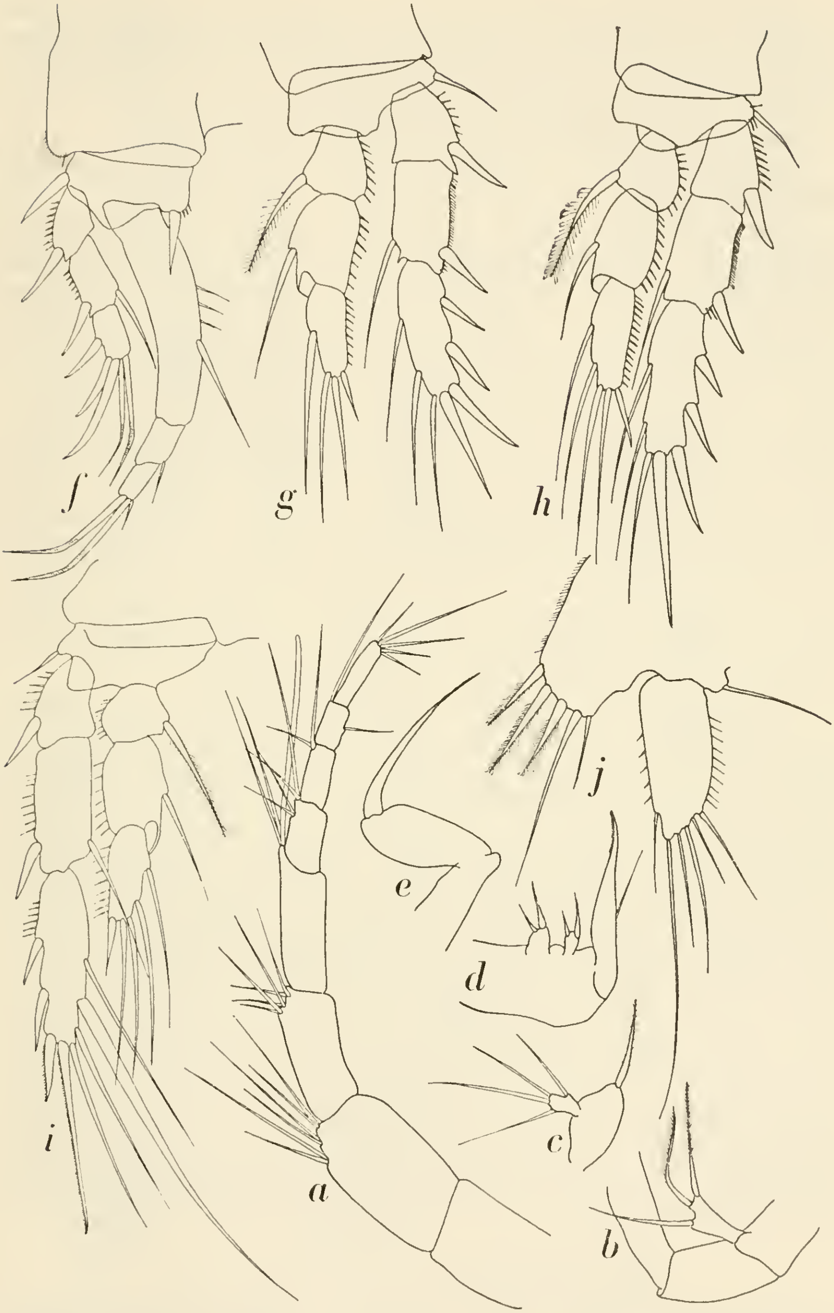

FIGURE 108.—*Nitocra affinis* Gurney, loc. 592, ad. ♀: *a*, antennule; *b*, proximal part of antenna with exopodite; *c*, mandibular palp; *d*, maxilla; *e*, maxillipede; *f*, leg 1; *g*, leg 2; *h*, leg 3; *i*, leg 4; *j*, leg 5. (× 460.)

Exopodite of leg 5 twice as long as broad, ovate; external wall straight and spinulose, internal wall convex. 6 marginal setae, distribution of which appears from figure 106*g*. Baso-endopodite short, reaching ¼ length of exopodite, with 4 setae.

Leg 6 (armature of genital plates) composed of 2 setae.

Color as in female. Lenticular spots at base of rostrum less distinctly developed.

REMARKS.—The specimens described above agree in all essential details with Gurney's description; they also have the same setal formula, which is different from all other *Nitocra* species. The transformation of the internal spine on the basis of leg 1 in the Ifaluk specimens (and apparently also in Gurney's specimens since this character is not mentioned in his description) is less than in the specimen recorded by Petkovski (1954) and Roe (1958). Petkovski, moreover, has described a variety as *Nitocra affinis* f. *rijekana*, which is very little different from the typical form (the differences are the shape of the above-mentioned spine of leg 1, the development of the internal setae on the 3rd exopodal segment of leg 4, and the length of the setae on leg 5). It is not impossible that several closely allied forms have been lumped together under the heading *Nitocra affinis* Gurney, which are all linked together by the same aberrant setal formulae but are different in several other characters.

The species has been described by Gurney (1927) from Port Taufiq and Ismailia in the Suez Canal zone (♀ 0.61 mm., ♂ 0.48 mm.). Willey (1930) subsequently mentioned specimens from Mangrove Bay on Somerset Island, Bermuda (♀ 0.51–0.63 mm., ♂ 0.425 mm.). Additional records are from the Dalkey area of County Dublin, Ireland (Roe, 1958); Castro Marina (probably Castellammarre), southern Italy (Chappuis, 1938); and near Dubrovnik, Yugoslavia, on the Adriatic (Petkovski, 1954). Petkovski's form *rijekana* was found near Rijeka, Yugoslavia, in the northern Adriatic (♀ 0.6 mm., ♂ 0.5 mm.). In the majority of the above-mentioned localities the species was found in sand, living in the interstitial water of sandy beaches, etc. In the Ifaluk collection also the species occurs exclusively in sand samples: it was found in nearly the whole of transect B, which was made at about the middle of Falarik in the Ifaluk Atoll, from the reef margin inward, at distances varying from 60 to 340 feet from the reef margin. The species appears to be a characteristic component of the interstitial water masses of the sandy beaches of Ifaluk.

Genus *Leptomesochra* G. O. Sars, 1911

Since Lang's revision (1948, p. 838) of this genus (type species *Normanella attenuata* A. Scott, 1896), many new species have been

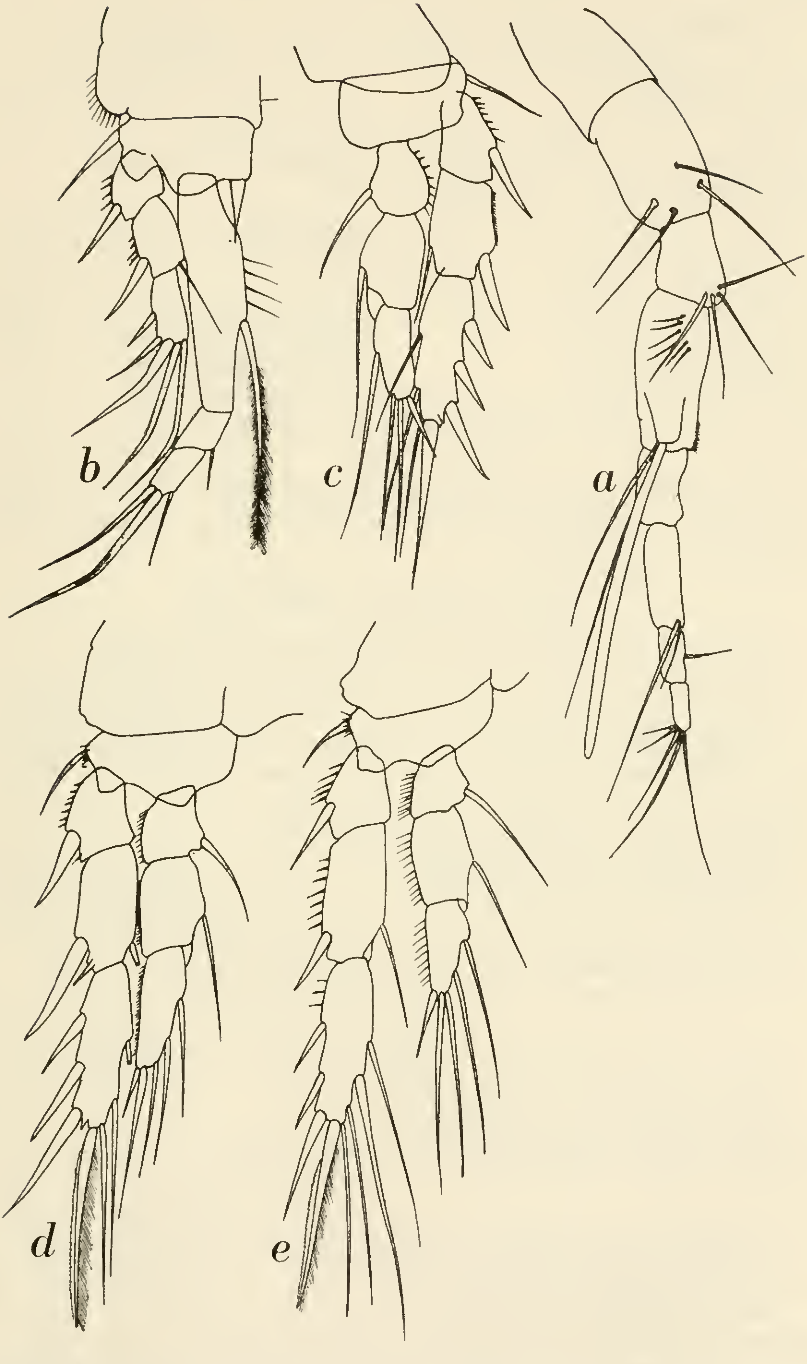

Figure 109.—*Nitocra affinis* Gurney, loc. 591, ad. ♂: *a*, antennule; *b*, leg 1; *c*, leg 2; *d*, leg 3; *e*, leg 4. (× 520.)

added, with the result that, at present, it stands as follows:

FEMALES	MALES
Mesochra Macintoshi T. and A. Scott, 1895	(*M. Macintoshi* T. and A. Scott, 1895)
Normanella attenuata A. Scott, 1896	*N. attenuata* A. Scott, 1896
Leptomesochra tenuiccornis G. O. Sars, 1911	
L. confluens G. O. Sars, 1911	*L. confluens* G. O. Sars, 1911
L. infima Monard, 1928	
L. nasuta Sewell, 1940	
L. africana Kunz, 1951	*L. africana* Kuna, 1951
L. eulitoralis Noodt, 1952	*L. eulitoralis* Noodt, 1952
L. elongata Božić, 1955	*L. elongata* Božić, 1955
L. nichollsi Noodt, 1955b	*L. nichollsi* Noodt, 1955b

(=*Leptameira attenuata* Nicholls, 1939 not A. Scott)

The following key may serve to distinguish between the various species; it has been translated from Noodt (1955b, p. 96) and the new species have been added.

Key to the Species of *Leptomesochra*

1. Segment 2 of exopodite of leg 1 with external marginal spine 3

Segment 2 of exopodite of leg 2 without external marginal spine 2

2. Exopodite and baso-endopodite of leg 5 fused; 3rd segment of exopodite leg 4 with 7 appendages . . . . **L. nichollsi** Noodt

Exopodite and baso-endopodite of leg 5 separate; 3rd segment of exopodite leg 4 with 5 appendages . . . . . . **L. macintoshi** (T. and A. Scott)

3. Segment 3 of exopodite leg 1 with 4 appendages 4

Segment 3 of exopodite leg 1 with 5 appendages 7

4. Endopodite of leg 4, 2-segmented 5

Endopodite of leg 4, 3-segmented . . . . **L. attenuata** (A. Scott)

5. Segment 3 of exopodites legs 2 to 4 with 2 spines along external margin. **L. infima** Monard

Segment 3 of exopodites legs 2 to 4 with 3 spines along external margin . . 6

6. Rostrum big, segment 2 of endopodite leg 2 with 5 appendages. **L. nasuta** Sewell

Rostrum small, segment 2 of endopodite leg 2 with 3 appendages. **L. confluens** G. O. Sars

7. Endopodite of leg 3, 2-segmented 8

Endopodite of leg 3, 3-segmented 9

8. 2nd segment of exopodites legs 3 and 4 with internal seta; total number of appendages on 3rd endopodal segment of leg 4 is 5. **L. pygmaea,** new species

2nd segment of endopodites legs 3 and 4 without internal seta; appendages on 3rd endopodal segment of leg 4 number 4 . . . . . **L. africana** Kunz

9. Baso-endopodite of leg 5 with 4 setae . . . . . **L. tenuicornis** G. O. Sars

Baso-endopodite of leg 5 with 3 setae 10

10. 2nd segment of endopodite leg 2 with 3, 3rd segment of endopodite leg 4 with 4 appendages. 7 appendages along margin of exopodite leg 5. **L. elongata** Božić

2nd segment of endopodite leg 2 with 2, 3rd segment of endopodite leg 4 with 3 appendages. Exopodite of leg 5 with 5 appendages.
L. eulitoralis Noodt

Leptomesochra pygmaea, new species

FIGURES 110, 111

MATERIAL.—Loc. 592, 1 ad. ♀, 0.28 mm.

DESCRIPTION.—The following is from the above-mentioned female specimen (holotype), which has been dissected and mounted.

Adult female, total length 0.28 mm.; greatest diameter 0.06 mm.; length of longest furcal seta, 0.30 mm.

General shape of body very slender, almost linear, especially in dorsal aspect (fig. 110*a*). Division between cephalothorax and abdomen very indistinct. Greatest diameter of body at end of cephalic somite, almost imperceptibly narrowing posteriorly, anterior part very slightly narrowing, rounded at antennular basis. Insertion of antennules in rounded incision; between antennular bases very small rostrum visible. Head and 1st thoracic somite completely fused, short, as long as combined lengths of thoracic somites 2 and 3; back in lateral aspect very gently curved (fig. 110*b*).

5th thoracic somite small, visible as narrow ring at anterior part of abdomen, carrying very small 5th legs.

Genital somite (fig. 111*f*) composed of completely fused abdominal somites 1 and 2; line of fusion visible at dorsolateral surface as chitinized ridge. 3rd abdominal somite shorter than 4th. Some spinules occur at distal part of ventral margins of genital and 3rd abdominal somites. Anal somite shorter than 4th, deeply incised, anal flap broadly rounded, in very proximal position. Furcal rami as long as wide, completely nude. 5 marginal setae and 1 appendicular seta on each ramus. Setae 1, 4, 5, and appendicular seta small and fine, setae 2 and 3 thickened and lengthened, especially 2nd, which surpasses total length of body.

Antennules (fig. 111*g*) long and slender, reaching end of 2nd thoracic somite, 8-segmented. Basal 4 segments are fairly long, distal 4 short; segment 4 with small conical process, bearing aesthetasc and 2 setae.

Antenna (fig. 111*h*) with basis and 1st endopodal segment separate. Exopodite styliform, 2-segmented, both segments with a seta. Endopodite with 5 setae and 2 spines.

The dissection of the mouth parts in this small specimen proved to be unsuccessful; the ventral aspect of the genital somite is represented in figure 111*f*; there are two setae on the genital plates.

Leg 1 (fig. 111*a*) with 3-segmented exopodite and endopodite. Basis small, with fine external seta and small internal spine. 1st endopodal segment styliform, 1½ times as long as whole exopodite,

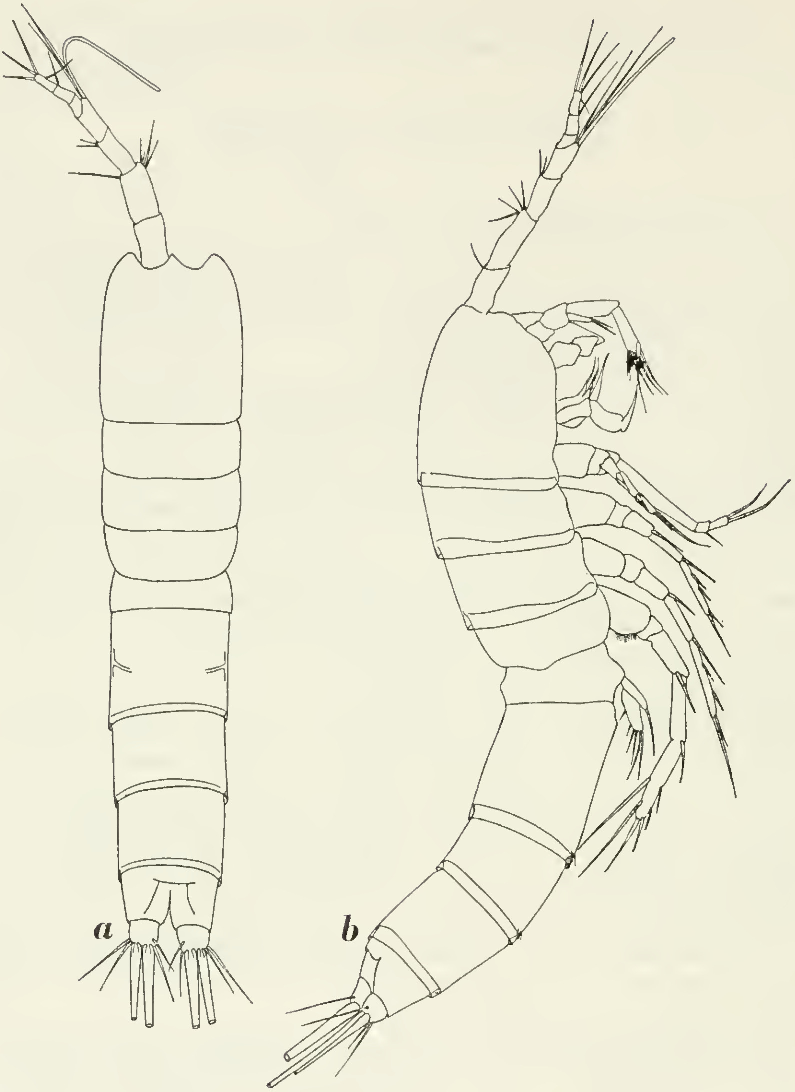

Figure 110.—*Leptomesochra pygmaea*, new species, loc. 592, ad. ♀, holotype: *a*, whole animal, dorsal view; *b*, same animal, lateral view from right side. (× 310.)

4½ times as long as broad. Small subapical seta at internal margin, rest of internal margin set with widely spaced hairs. 2nd endopodal segment small, with fine internal seta. 3rd endopodal segment 1½ times as long as 2nd, twice as long as wide, with 2 unequal, curved, setiform spines and a fine seta. Exopodal segments of equal length, 2nd without internal seta, 1st and 2nd with external marginal spine. 3rd exopodal segment with total of 5 appendages.

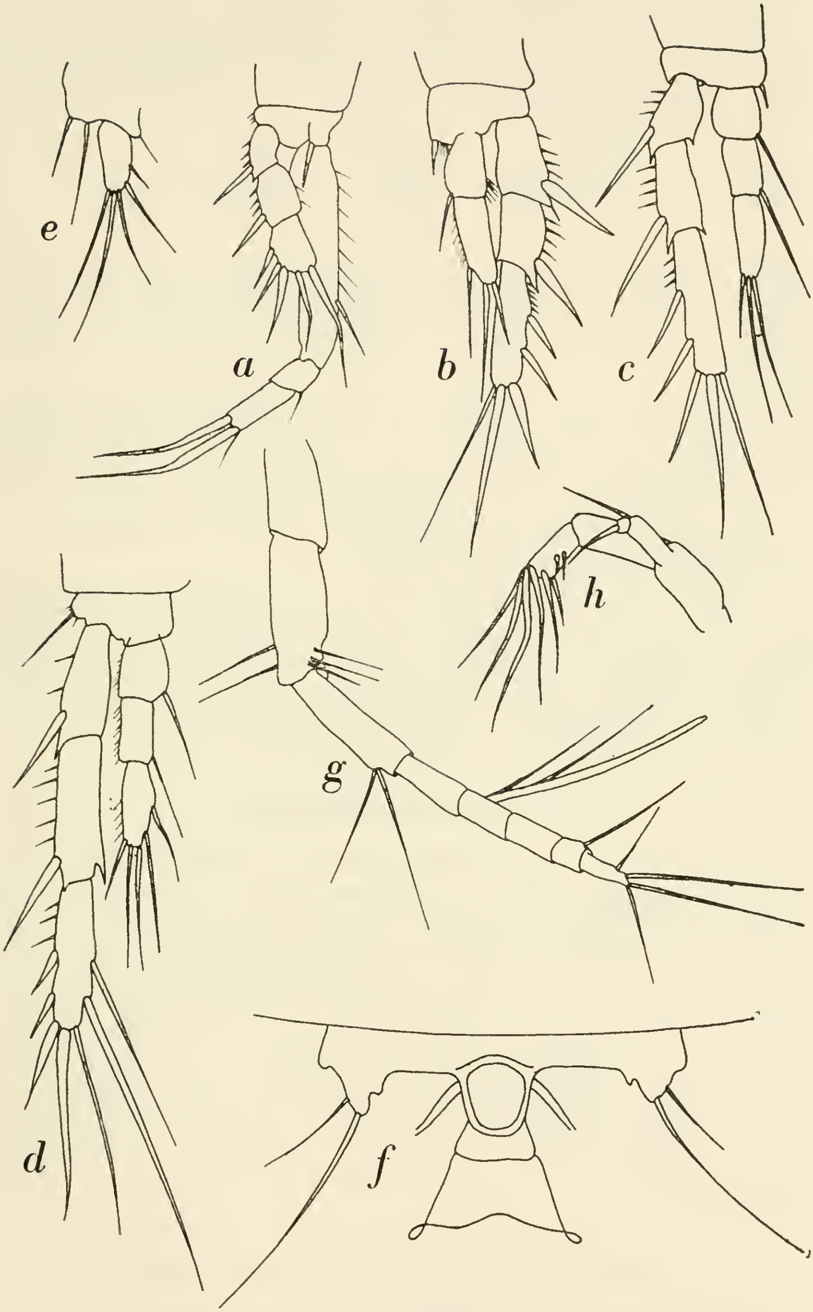

Figure 111.—*Leptomesochra pygmaea*, new species, loc. 592, ad. ♀, holotype: *a*, leg 1; *b*, leg 2; *c*, leg 3; *d*, leg 4; *e*, leg 5; *f*, genital somite, ventral view; *g*, antennule; *h*, antenna. (× 625.)

Leg 2 (fig. 111*b*) with 3-segmented exopodite and 2-segmented endopodite. Legs 3 and 4 with 3-segmented endopodite and exopodite. The various details of the legs can best be taken from figures 111*b*–*d*; the setal formula is:

	endopodite	*exopodite*
leg 2	1.120	0.0.023
leg 3	1.1.021	0.0.023
leg 4	1.1.221	0.0.223

No seta along internal border of 3rd exopodal segment of legs 2 and 3. Leg 4 with strongly developed exopodite; internal border of segments 1 and 2 produced into fine tooth. Setae of endopodite very fine.

Leg 5 very small. Baso-endopodite scarcely elevated, reaching ⅕ length of exopodite, with 2 setae. External lobe scarcely visible, with very fine seta. Exopodite twice as long as wide, with 5 marginal setae, distribution of which appears clearly from figure 111*e*.

The specimen is completely colorless and almost transparent; no eye or pigmented spots could be observed.

Remarks.—This new species is, as appears from the segmentation and setation of the endopodites, closely related to *Leptomesochra africana* Kunz, 1951, but different in the size (it is only half as long), in its smaller rostrum, and in details of the setation of legs 3, 4, and 5. A single female specimen occurred in a sand sample taken some 340 feet from the reef margin at Falarik in the Ifaluk Atoll.

Family Tetragonicepsidae Lang, 1944

The genera *Tetragoniceps* Brady, 1880, *Pteropsyllus* T. Scott, 1906, *Diagoniceps* Willey, 1930, and *Phyllopodopsyllus* T. Scott, 1906, were independently brought to separate families by Lang (1944, p. 27) in his family Tetragonicepsidae and by Nicholls (1944, p. 492) in his family Pteropsyllidae. Lang's paper is dated February 10, 1944; Nicholls', August, 1944; Lang's name clearly must have priority. Lang also split up the genus *Phyllopodopsyllus*, viz, *Phyllopodopsyllus* T. Scott, 1906, sensu Lang, with type species *Tetragoniceps bradyi* T. Scott, 1892, and *Paraphyllopodopsyllus*, Lang, 1944, with the type species *Phyllopodopsyllus mossmani* T. Scott, 1912. The genus *Phyllopodopsyllus* in its restricted sense is represented in the Ifaluk collection by one of its species.

Genus *Phyllopodopsyllus* T. Scott, 1906

The differences between *Phyllopodopsyllus* T. Scott and *Paraphyllopodopsyllus* Lang, 1944, have become very vague since the introduction of new species. Lang originally distinguished between both genera in the following way:

Phyllopodopsyllus: 2nd segment of antennule with big spur; 1st endopodal segment of leg 2 without seta; 3rd exopodal segment of leg 2 with 1, 3rd exopodal segment of leg 3 with 2 internal setae.

Paraphyllopodopsyllus: 2nd segment of antennule without spur; 1st endopodal segment of leg 2 with seta; 3rd exopodal segment of legs 2 and 3 without internal setae.

Nicholls (1944a, p. 493) introduced a new form as *Phyllopodopsyllus aegypticus*, which in setation is a typical *Phyllopodopsyllus* but lacks the spur on the antennule.

Petkovski (1955) described *Phyllopodopsyllus briani* (p. 126) and *Phyllopodopsyllus thiebaudi* (p. 130) with a scarcely developed spur on the antennule, 1 seta on the 1st endopodal segment of leg 2, and internal setae on the 3rd exopodal segments of legs 2 and 3.

A revision of the characters separating both genera, consequently, seems to be indicated. I have, for the present, left both genera separate and I have used, as the only characteristic to discriminate between them, the presence or complete absence of the spur on the 2nd segment of the antennule. It seems likely that the discovery of more species will show that *Paraphyllopodopsyllus* has no more standing than a subgenus of *Phyllopodopsyllus*, or it may even sink completely into the synonymy of *Phyllopodopsyllus*. Nicholls' species must be referred to *Paraphyllopodopsyllus* in the sense used here, where it should stand as *Paraphyllopodopsyllus aegypticus* (Nicholls, 1944); Petkovski's species should remain in the genus *Phyllopodopsyllus*, of which the following species are now known:

FEMALES	MALES
Tetragoniceps Bradyi T. Scott, 1892	*T. Bradyi* T. Scott, 1892
T. minor Thompson and A. Scott, 1903	
Phyllopodopsyllus furciger G. O. Sars, 1907 (=*P. furcifer* in the explanation of pl. 156)	
P. longicaudatus A. Scott, 1909	*P. longicaudatus* A. Scott, 1909
P. bermudae Lang, 1948	*P. bermudae* Lang, 1948
P. minutus Lang, 1948	*P. minutus* Lang, 1948
P. briani Petkovski, 1955	*P. briani* Petkovki 1955
P. thiebaudi Petkovski, 1955	*P. thiebaudi* Petkovski, 1955
P. pauli Crisafi, 1960	

The position of the following species is uncertain:

P. armatus Willey, 1935	*P. armatus* Willey, 1935

(probably a *Laophontella*)

The following species is a nomen nudum:

P. dissimilis Brian, 1923

The following keys may serve to distinguish between the various species:

Key to the Species of *Phyllopodopsyllus*

FEMALES

1. Furcal rami longer than anal somite, more than 3 times as long as maximal width 2
   Furcal rami about as long as anal somite, about 2 times as long as maximal width 7
2. External margin of furcal rami with single seta inserting halfway along that margin . . . . **P. minor** (Thompson and A. Scott)
   External margin of furcal rami with 2 setae 3
3. Long, terminal seta on furcal rami strongly swollen at base 4
   Long terminal seta on furcal rami not swollen at base 5
4. 3rd exopodal segment of leg 4 with total of 6 setae . . **P. furciger** G. O. Sars
   3rd exopodal segment of leg 4 with total of 7 setae . . . **P. bermudae** Lang
5. 1st endopodal segment of leg 2 with internal seta. Spur on 2nd antennular segment small, knob-shaped . . . . **P. briani** Petkovski
   1st endopodal segment of leg 2 without internal seta. Spur on 2nd antennular segment strongly developed, acutely pointed. 6
6. Furca straight; 1st segment of endopodite leg 3 without internal seta; 2nd segment of endopodite leg 4 with 2 setae . . . . **P. minutus** Lang
   Furca weakly sigmoid; 1st segment of endopodite leg 3 with 1 internal seta; 2nd segment of endopodite leg 4 with 3 setae. **P. longicaudatus** A. Scott
7. Furca cylindrical, internal and external border parallel. Strong apical seta short, 1½ times as long as furca, swollen at base . . . . **P. pauli** Crisafi
   Furca basally strongly swollen. Strong apical seta on furca lengthened . . 8
8. Proximal part of internal furcal wall strongly swollen and spinulose. 1st segment of endopodite leg 2 without seta . . . . . **P. bradyi** (T. Scott)
   Proximal part of external furcal wall strongly swollen. 1st segment of endopodite leg 2 with 1 seta . . . . **P. thiebaudi** Petkovski

MALES

1. Segment 1 of endopodite leg 3 with 1 internal seta 2
   Segment 1 of endopodite leg 3 without internal seta 5
2. Spur scarcely visible, knob-shaped 3
   Spur strongly developed, acutely pointed 4
3. Furca 5 times as long as wide, slightly tapering, with longitudinal carina, placed close to internal wall. Baso-endopodite of leg 5 with 3 setae, the more median of which is normally developed . . . . **P. briani** Petkovski
   Furca 3 times as long as wide, slightly swollen at proximal part of internal margin. Baso-endopodite of leg 5 with 3 setae, of which the more median is short . . . . **P. thiebaudi** Petkovski
4. Internal 2 of 5 marginal setae of exopodite leg 5 strong and broad; 2 of 3 setae of baso-endopodite of leg 5 also thickened . . **P. bradyi** (T. Scott)
   All setae of leg 5 normally developed . . . . **P. longicaudatus** A. Scott
5. 3rd segment of exopodite leg 4 with 3 internal setae, bringing total number of appendages on this segment up to 7. 2nd endopodal segment of leg 4 with 2 setae . . . . **P. bermudae** Lang
   3rd segment of exopodite leg 4 with 2 internal setae, bringing total number of appendages on this segment up to 6. 2nd endopodal segment of leg 4 with 1 seta . . . . **P. minutus** Lang

Phyllopodopsyllus bradyi (T. Scott, 1892)

Tetragoniceps bradyi T. Scott, 1892, p. 253, pl. 9 (figs. 19–32).—I.C. Thompson, 1893, p. 197, pl. 27 (figs. 8b–f).—T. Scott, 1894a, p. 234.—Brady, 1905, pp. 211, 217, pl. 5 (figs. 1–10).

Phyllopodopsyllus bradyi.—T. Scott, 1906, p. 459.—Sars, 1907, p. 231, pl. 155.—Norman and Brady, 1909, p. 387.—Sars, 1911, p. 409, suppl pl. 37 (fig. 2).—Pesta, 1927, p. 49.—Lang, 1934, p. 35.—Sewell, 1940, pp. 127, 304.—Lang, 1944, p. 28.—Nicholls, 1944a, p. 492.—Lang, 1948, p. 885, fig. 356 (no. 1).—Klie, 1950, p. 101.—Petkovski, 1955, p. 132.—Crisafi, 1960, p. 500.

This species is known from Farsund, Flekkeroy, and Korshavn on the Skagerrak coast of Norway (Sars, 1907, 1911); from the Helgoland area of Germany (Klie, 1950); from the Northumberland and Durham coasts, between St. Mary's Island and Souter Point, of England (Brady, 1905; Norman and Brady, 1909); and from Port Erin on the Isle of Man (I. C. Thompson, 1893). It has been found on muddy and sandy bottoms; ♀ 0.8 mm., ♂ 0.6 mm.

Phyllopodopsyllus minor (Thompson and A. Scott, 1903)

Tetragoniceps minor Thompson and A. Scott, 1903, pp. 238, 268, pl. 8 (figs 23–28).

Phyllopodopsyllus minor.—Sewell, 1940, pp. 306, 369.—Nicholls, 1944a, p. 492. Lang, 1948, p. 885, fig. 356 (no. 2).—Crisafi, 1960, p. 500.

This species is based on a single female specimen, 0.5 mm. long, from oyster washings of the pearl oyster banks of Ceylon (Thompson and A. Scott, 1903); it has not been recorded since.

Phyllopodopsyllus furciger G. O. Sars, 1907

Phyllopodopsyllus furciger Sars, 1907, p. 233, pl. 151 (fig. 2).—Pesta, 1927, p. 49.—Sewell, 1940, pp. 127, 304, 373, 374, figs. 70a–i.—Nicholls, 1944a, p. 492.—Lang, 1948, p. 886, fig. 356 (no. 3).—Petkovski, 1955, p. 129.—Crisafi, 1960, p. 500.

A single female specimen, 0.73 mm. long, was used by Sars for the description of this species; it originated from Farsund on the Skagerrak coast of Norway, where it was found at 30 fms. depths on a muddy sand bottom. An additional female specimen was recorded and fully described by Sewell (1940); this specimen, 0.80 mm. long, originated from the south Arabian coast, where it was found at 40 m. depth in mud.

Phyllopodopsyllus longicaudatus A. Scott, 1909

FIGURES 112, 113, 114*a–d*

Phyllopodopsyllus longicaudatus A. Scott, 1909, p. 233, pl. 60 (figs. 17–25).—Sewell, 1940, pp. 127, 306, 375.—Nicholls, 1944a, p. 492.—Lang, 1948, p. 887, fig. 356 (no. 4).—Crisafi, 1960, p. 500.

MATERIAL.—Loc. 592, 1 ad. ♀, 0.62 mm. Loc. 800, 1 ad. ♀, 0.48 mm.; 1 juv. ♂, 0.38 mm.

Description.—The following is based on the adult female (loc. 592), which has been dissected and mounted. Some notes on the two remaining specimens, which are preserved as whole mounts, are included here.

Adult female, total length 0.62 mm.; greatest diameter 0.14 mm.; length of longest furcal seta 0.18 mm.

General shape of body comparatively slender, with greatest diameter in oral region; anteriorly more or less rounded, posteriorly gradually narrowing, in dorsal view of very characteristic appearance. In dorsal aspect division between cephalothorax and abdomen scarcely visible, in lateral view marked by strong curvature of body (fig. 112*d*). Head and 1st thoracic somite completely fused to form cephalic somite, which in length slightly exceeds thoracic somites 2 to 4 combined. Sides of cephalic somite slightly angularly produced, covering basal parts of oral appendages; oral field greatly produced and protruding. Extreme anterior part of cephalic somite, between antennules, obtuse; rostrum small; integument of cephalic somite, as appears from lateral view, curves inward to form short plate, medially broadly incised to form 2 blunt points (fig. 114*a*). Thoracic somites 2 to 4 of equal length, epimeral plates well produced, rounded. Some spinules occur along distal border of thoracic somite 4.

5th thoracic somite distinctly visible, especially traceable by big 5th feet, distally with some dorsal spinules. Genital somite composed of more or less fused abdominal somites 1 and 2; line of fusion very distinct dorsally and laterally. Abdominal somites 1 to 3 of nearly same length; somite 4 and anal somite shorter. Anal somite twice as broad as long, anal flap broadly rounded. Furcal rami very long and slender, half length of abdomen, 4 times as long as anal somite and 7 times greatest diameter. Some small spinules on anal somite near insertion of furcal rami. Rami diverging slightly, each slightly but distinctly sigmoid, and at same time narrowing from base to apex, internally haired (fig. 112*f*). Each ramus has 5 marginal setae and 1 appendicular seta. Setae 1, 3, 4, 5, and appendicular seta of equal length, short. Seta 1 at end of internal border; setae 4 and 5 at ⅓ and ⅔ of external border, seta 3 at end of external border. Seta 2 greatly lengthened and thickened, not swollen at base.

Antennules (fig. 113*f*) short, about as long as cephalic somite, 9-segmented; jointing between segments 7 and 8 indistinct, with the result that they can easily pass as 8-segmented. Segment 1 lengthened, about 4 times as long as broad. 2nd segment with large, externally directed spur. Segment 4 with conical process, carrying aesthetasc and 2 setae. Setation represented in figure 113*f*.

Antenna (fig. 113*g*) with basis and 1st endopodal segment separate. Basis long and slender. Exopodite styliform, 1-segmented, with 3

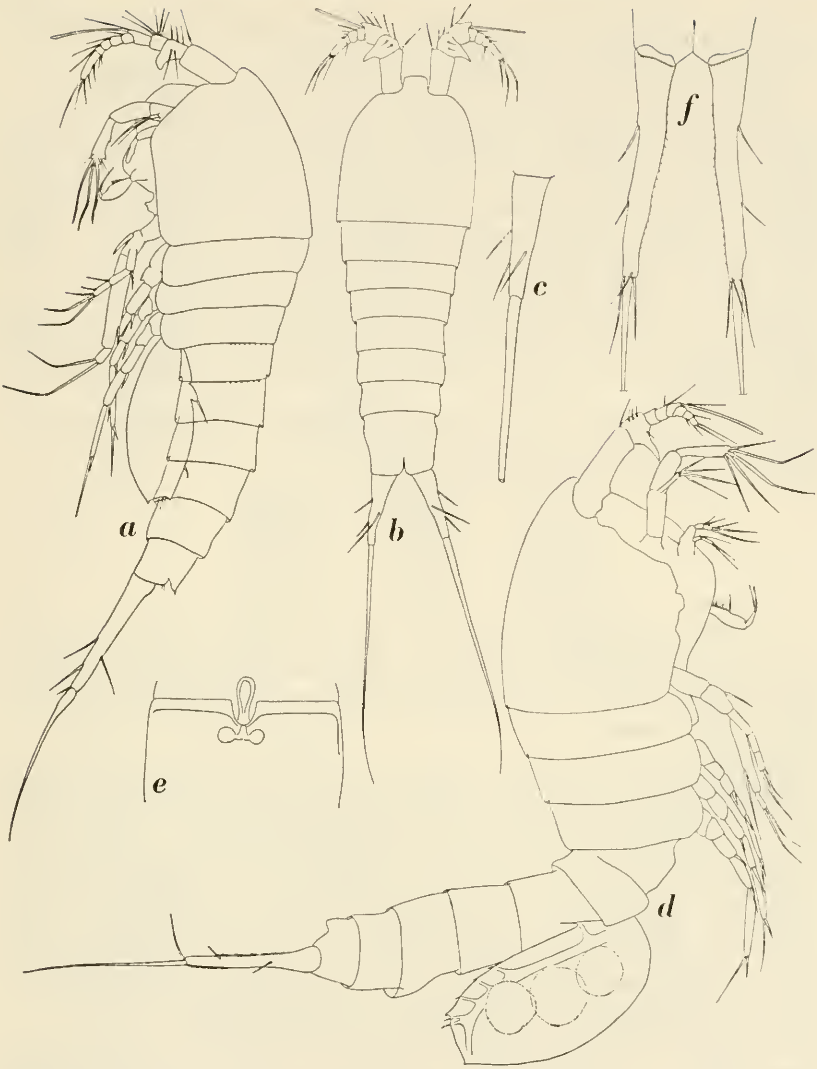

FIGURE 112.—*Phyllopodopsyllus longicaudatus* A. Scott, loc. 800, ad. ♀: *a*, whole animal, lateral view from left side; loc. 800, juv. ♂: *b*, whole animal, dorsal view; *c*, left furcal ramus; loc. 592, ad. ♀: *d*, whole animal, lateral view from right side; *e*, genital somite, ventral view; *f*, furcal rami, dorsal view. (*a*, *b*, *d*, × 165; *c*, *e*, *f*, × 275.)

setae. Endopodite 2-segmented, segments of equal length, elongate; terminal segment with total of 8 setae, 6 of which are apical.

Mandible (fig. 114*b*) with strongly chitinized praecoxa, cutting edge with 5 distinct, acute teeth and proximal, haired seta. Basipodite swollen, with 2 setae. Exopodite styliform, unsegmented, with total of 4 setae. Endopodite 1-segmented, styliform, larger than exopodite, with total of 6 setae, 4 of which occur at apex.

I failed to obtain a satisfactory preparation of the maxillule.

Maxilla (fig. 114*c*) with swollen praecoxa with 2 endites, bearing 2 and 1 seta respectively; swelling externally haired. Coxa with 2 endites, each with 2 setae. Basis composed of 2 segments: segment 1 with endite, carrying strong, curved spine and seta; segment 2 with scarcely visible endite, pressed against endite on segment 1, with single seta. Endopodite with total of 3 setae, 2-segmented.

Maxillipede (fig. 114*d*) chelate, coxa with 2 haired setae near jointing with basis. Basis scarcely swollen, with internal row of hairs. Endopodite unsegmented, forming curved digit, as long as basis, and with additional seta.

Legs 1 to 4 (figs. 113*a–d*) with 2-segmented endopodites and 3-segmented exopodites; the setal formula is:

	endopodite	*exopodite*
leg 1	1. 020	0. 0. 022
leg 2	0. 021	1. 0. 122
leg 3	1. 021	1. 0. 222
leg 4	1. 021	1. 1. 222

Leg 1 (fig. 113*a*) with external seta and internal spine on basis. 1st endopodal segment styliform, 6 times as long as broad, internal seta strongly haired. 2nd endopodal segment twice as long as broad, with 2 apical setae.

Legs 2 to 4 with strong spine on basis between insertion of endopodite and exopodite. External seta on basis fine; legs 2 and 3 with basis at internal margin produced to form spine. Legs 2 and 3 normally developed and, except for small differences in setation, very much alike. Leg 4 with greatly lengthened exopodite and short endopodite; especially 1st endopodal segment very short. All 3 exopodal segments lengthened, segments 1 and 2 with very small external spine; segment 3 with 2 very small external marginal spines. All setae of segment 3 concentrated on apical portion.

5th legs of both sides greatly developed, strongly curved, forming incubatory pouch containing (in this specimen) 6 big eggs. Exopodite and baso-endopodite of each side fused, forming hollowed spoon-shaped structure, both sides touching but not actually fused. External lobe visible and with fine seta. The shape of each leg can best be judged from figure 113*e*, but it should be remembered that the outline, as represented in the drawing, is influenced by pressure of the cover glass on this hollow structure. External margin with 3 fine setae, margin terminating in spine. 2 more setae at caudal border and small, haired seta near end of internal border.

Color faded, yellowish, more or less transparent. No eye or pigmented spot visible.

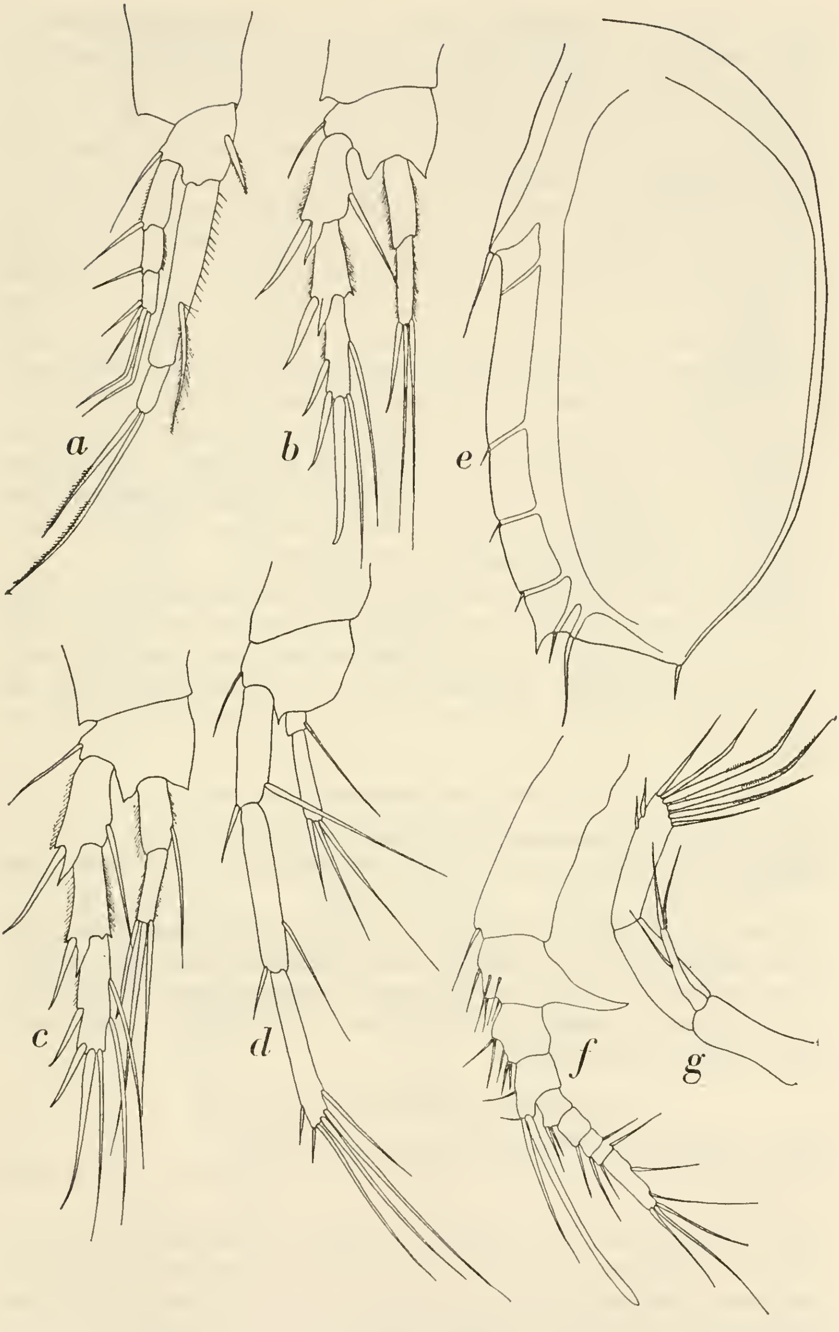

Figure 113.—*Phyllopodopsyllus longicaudatus* A. Scott, loc. 592, ad. ♀: *a*, leg 1; *b*, leg 2; *c*, leg 3; *d*, leg 4; *e*, leg 5; *f*, antennule; *g*, antenna. (× 460.)

The female specimen from locality 800 is very strongly contracted and consequently much shorter (figs. 112*a*). The young male has 7-segmented antennules, while the 4th and 5th (anal) somites of the abdomen are fused. Furcal structure as in adult female (fig. 112*b*, *c*).

Remarks.—I have identified the specimens described above with *Phyllopodopsyllus longicaudatus* A. Scott, 1909, described from a single male specimen captured by the Siboga Expedition near Paternoster Island in the Malay Archipelago. The resemblance of the adult female specimens with the male described by A. Scott is particularly striking as far as the furcal structure is concerned. There are differences in the setation of the endopodites of legs 3 and 4, but differences in setation of these appendages in the sexes are known also to occur in species where male and female are definitely known, e.g., *P. bradyi* (T. Scott, 1892), which shows the same differences in setation between the sexes as are shown by the Ifaluk specimens and A. Scott's description of the male. With *P. bradyi*, the present form is undoubtedly closely related; both species have identical setal formulae and differ principally in furcal structure.

A single male specimen, 0.58 mm. long, was captured in a night surface plankton haul off Island Kawasang, Paternoster Island, during the Siboga Expedition. The species has not been recorded since. The present specimens originate from a sand sample taken some 340 feet off the reef margin and from beneath boulders at Falarik in the Ifaluk Atoll.

Phyllopodopsyllus bermudae Lang, 1948

Phyllopodopsyllus longicaudatus Willey, 1935, p. 88, figs. 149–162.
Phyllopodopsyllus bermudae Lang, 1948, p. 887, fig. 357 (no. 2).—Crisafi, 1960, p. 500.

Males and females of this form were recorded from Harrington Sound in Bermuda by Willey. The description and figures leave no doubt that this species differs from *P. longicaudatus*, under which name they were recorded. ♀ 0.93 mm.; ♂ 0.63 mm. The species has not been recorded since.

Phyllopodopsyllus minutus Lang, 1948

Phyllopodopsyllus minor Willey, 1935, p. 91, figs. 163–172.
Phyllopodopsyllus minutus Lang, 1948, p. 887, fig. 357 (no. 1.)—Crisafi, 1960, p. 500.

Males and females were found by Willey in Harrington Sound in Bermuda and recorded as *P. minor*; they belong, as Lang proved, to a new form, described by him as *P. minutus*, ♀ 0.66 mm.; ♂ 0.54 mm. The species has not been recorded since.

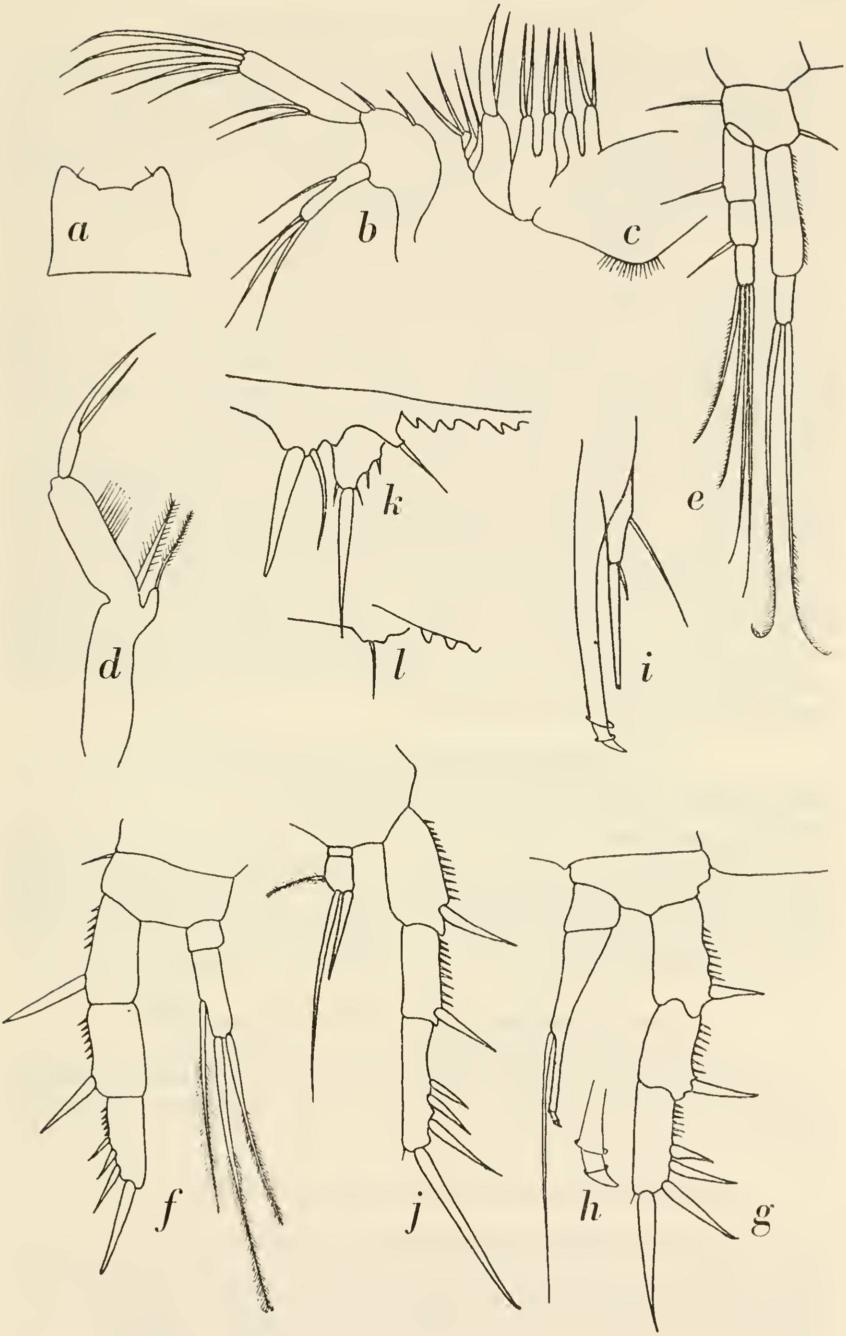

FIGURE 114.—*Phyllopodopsyllus longicaudatus* A. Scott, loc. 592, ad. ♀: *a*, rostrum, ventral view; *b*, mandibular palp; *c*, maxilla; *d*, maxillipede. *Orthopsyllus dubius*, new species, loc. 594, ad. ♂, holotype: *e*, leg 1; *f*, leg 2; *g*, leg 3; *h*, distal part endopodite leg 3; *i*, endopodite leg 3; *j*, leg 4; *k*, leg 5; *l*, leg 6. (*a–g*, *k*, *l*, × *625*; *h*, *i*, × 1000.)

Phyllopodopsyllus briani Petkovski, 1955

Phyllopodopsyllus briani Petkovski, 1955, p. 126, figs. 1–13; 1957, p. 9.

Described by Petkovski from female and male specimens from Budva, Herceg Novi, and probably also Dubrovnik on the Adriatic coast of Yugoslavia. ♀ 0.70 mm.; ♂ 0.50 mm. An inhabitant of interstitial water masses of sandy beaches.

Phyllopodopsyllus thiebaudi Petkovski, 1955

Phyllopodopsyllus thiebaudi Petkovski, 1955, p. 130, figs. 14–20; 1957, p. 9.

Described by Petkovski from female and male specimens from Herceg Novi on the Adriatic coast of Yugoslavia; subsequently found also at Dubrovnik on that coast. ♀ 0.70 mm.; ♂ 0.65 mm. Also living in the interstitial water of sandy beaches.

There is a very striking resemblance between *Phyllopodopsyllus thiebaudi* and *Paraphyllopodopsyllus intermedius* Noodt (1955b, p. 97, figs. 49–66). The very characteristic furcal structure is identical in both forms, as is the structure of leg 5. The only difference in setation is found in the exopodite of leg 4: *P. thiebaudi* apparently has 3 setae at the internal margin; *P. intermedius*, 2. Noodt states emphatically that in his new form there is no tooth on the 2nd antenular segment; it should be remembered that in *P. thiebaudi* this tooth is no more than a small knob.

Phyllopodopsyllus pauli Crisafi, 1960

Phyllopodopsyllus pauli Crisafi, 1960, p. 495, figs. 1–8.

Female specimens of this species were described by Crisafi from Cape Tindari, Gulf of Patti, Sicily, Mediterranean Sea, a brackish water habitat with very changeable salinity, where the species apparently lives on the sandy bottom. The furcal structure is very peculiar and quite different from the other members of this genus.

Family Canthocamptidae G. O. Sars, 1906

Representatives of only two genera, *Orthopsyllus* Brady and Robertson, 1873, and *Nannomesochra* Gurney, 1932, are present in the collection.

Genus *Orthopsyllus* Brady and Robertson, 1873

I have accepted Lang's suggestion to consider *Lilljeborgia linearis* Claus, 1866, as a clearly defined species and as the type species of *Orthopsyllus*. Jakobi (1954) recently has introduced the genus *Katacletodes* as a new genus of the Cletodidae. A study of his figures and particularly of the setal formula of the species attributed to this genus, *K. improportionatus*, clearly shows that *Katacletodes* is a synonym of *Orthopsyllus*. *K. improportionatus* very probably is identical with *O. linearis*. Jakobi apparently overlooked the small 1st endopodal segments of legs 2 and 3, which has put him on the wrong track. All information given about his new species (with the exception of the endopodites of legs 2 and 3) supports this view. The number of species lately has increased considerably, as evident in the following list, but the variability of the type species, *O. linearis*, which has a very wide distribution, is still insufficiently known. It seems probable, therefore, that some of the species of the list will sooner or later sink into the synonymy of *O. linearis*, particularly *O. major* Klie, 1939, and *O. agnathus* Klie, 1950. Klie, who considered *O. linearis* an uncertain species, failed to indicate differences between his new forms and the type species. Authors who subsequently recorded Klie's species apparently had no difficulty in recognizing these forms but failed to indicate on what grounds they reached their decisions. I am not particularly impressed by the characters which Noodt (1955) uses to discriminate between his form *bulbusus* of *O. linearis* and the type species, *O. agnathus*, and *O. major;* the sexual dimorphism in this form apparently is much more pronounced than in the typical *O. linearis*.

List of the species of *Orthopsyllus* Brady and Robertson, 1873:

FEMALES	MALES
Lilljeborgia linearis Claus, 1866	*L. linearis* Claus, 1866
(=*Katacletodes improportionatus* Jakobi, 1954)	
Orthopsyllus linearis f. *bulbosus* Noodt, 1955	*O. linearis* f. *bulbosus* Noodt, 1955
O. propinquus Monard, 1926b	*O. propinquus* Monard, 1926b
O. wallini Lang, 1934	*O. wallini* Lang, 1934
O. major Klie, 1939	*O. major* Klie, 1939
	O. spec. Sewell, 1940
O. rugosus Nicholls, 1941	
O. sarsi Klie, 1941	*O. sarsi* Klie, 1941
(=*O. linearis* G. O. Sars, 1909, not Claus)	
O. littoralis Nicholls, 1942a	*O. littoralis* Nicholls, 1942a
O. similis Nicholls, 1942a	*O. similis* Nicholls, 1942a
O. agnathus Klie, 1950	*O. agnathus* Klie, 1950
O. psammophilus Noodt, 1955a	*O. psammophilus* Noodt, 1955a
	O. dubius, new species
O. pectinicauda, new species	*O. pectinicauda*, new species

Key to the Females of *Orthopsyllus*

1. Body compressed dorsoventrally. 1st antennular segment with short external spine, 2nd segment without spine. Internal furcal corner produced to a short spine. 2 of furcal setae thickened, internal with thickened base terminating in fine filament; external a short spine. Exopodite and baso-endopodite of leg 5 fused . . . . **O. psammophilus** Noodt

Body not compressed dorsoventrally. 1st antennular segment without spine; 2nd segment with spine. Internal furcal border not produced; only one of setae lengthened and thickened, usually reaching considerable length. Exopodite and baso-endopodite of leg 5 separate 2

2. 3rd exopodal segment of legs 2 to 4 with 2 external marginal spines. **O. wallini** Lang

3rd exopodal segment of legs 2 to 4 with 3 external marginal spines . . . 3

3. 1st endopodal segment of legs 3 and 4 with 1 internal seta. **O. propinquus** Monard

1st endopodal segment of legs 3 and 4 without internal seta (such a seta seems to occur on leg 4 in *O. rugosus*) 4

4. 1st endopodal segment of leg 1 with internal seta . . . . . . **O. sarsi** Klie

1st endopodal segment of leg 1 without internal seta 5

5. Internal furcal border with pectinate or denticulate lamella 6

Internal furcal border nude, spinulose or haired, no lamella 8

6. External furcal border proximally with short crenulate lamella; internal furcal border with broad lamella with double fringe of denticules. 1st endopodal segment of leg 4 with internal seta . . . **O. rugosus** Nicholls

External furcal border smooth, internal border with pectinate lamella with teeth arranged in one row 7

7. Insertion of furca on anal somite, and anal flap bordered with fine teeth. Internal furcal lamella with 7–9 heavy teeth. 2nd endopodal segment of legs 2 and 3 with 3 setae . . . . **O. pectinicauda,** new species

Anal somite smooth; no teeth along furcal insertion or on anal plate. Internal furcal lamella with many fine teeth. 2nd endopodal segment of legs 2 and 3 with 2 setae . . . . **O. similis** Nicholls

8. 2nd exopodal segment of leg 2 with 1 internal seta; 2nd and 3rd exopodal segments of legs 3 and 4 each with 1 internal seta . **O. littoralis** Nicholls

2nd exopodal segment of leg 2 without internal seta; 2nd and 3rd exopodal segments of legs 3 and 4 without internal seta 9

9. Terminal antennular segment externally with short spine, inserting halfway along external margin . . . . **O. linearis** (Claus)

Terminal antennular segment externally with 1 or 2 setae 10

10. Terminal antennular segment with 1 external marginal seta. 3rd antennular segment about twice as long as terminal segment. Apex of baso-endopodite reaches apex of exopodite of leg 5; exopodite 3 times as long as wide . . . . **O. major** Klie

External margin of terminal antennular segment with 2 curved, denticulated spiniform setae. Baso-endopodite of leg 5 does not reach apex of exopodite; exopodite twice as long as broad 11

11. Anal plate with 6 teeth. Furcal rami internally spinulose, externally with short, denticulated proximal lamella. Two seta at external furcal border. Small species (1.15 mm.) . . . . **O. agnathus** Klie

Anal plate crenulated. Furcal rami internally haired, no external lamella, no setae at external border. Big species (1.54 mm.). **O. linearis f. bulbosus** Noodt

Orthopsyllus linearis (Claus, 1866)

Cletodes linearis Claus, 1866, p. 22, pl. 2 (figs. 1–8).
Orthopsyllus linearis.—Vàtova, 1928, p. 184.—Sewell, 1940, pp. 341, 343, 351, 360, 361, 363, 365, 367, 371, 373, 375.—Klie, 1941, p. 29.—Nicholls, 1941, pp. 420, 421, 422; 1942a, p. 137.—Lang, 1948, p. 959, fig. 377.—Klie, 1950, pp. 111, 112.—Noodt, 1955, p. 83.
Katacletodes improportionatus Jakobi, 1954a, p. 194, pl. 4 (figs. 1–11).

The geographical distribution of this species has been discussed by Lang (1948); no new localities have been added since. It is distributed widely in the Atlantic Ocean, where its area of distribution covers the northern temperate Atlantic, the tropical Atlantic, and the southern temperate Atlantic. It has been recorded also from the Mediterranean Sea and from several Indian and West Pacific localities. The females measure from 0.9 to 1.25 mm.; the males are smaller.

Orthopsyllus linearis f. *bulbosus* Noodt, 1955

Orthopsyllus linearis f. *bulbosus* Noodt, 1955, p. 83, pl. 9 (figs. 65–79).

This form is based on a female and a male specimen from the Sea of Marmara off Turkey (♀ 1.54 mm., ♂1.17 mm.) differing from the typical *O. linearis* in the structure of furca and antennule. The form shows a sexual dimorphism that is much more pronounced than in *O. linearis*; the male attributed by Noodt to this form has only 2 external marginal spines on the 3rd segment of leg 4 (3 in the female) and the internal margin of the furca in the male is spinulose.

Orthopsyllus propinquus Monard, 1926b

Orthopsyllus propinquus Monard, 1926b, pp. 44, 54, figs. 64–73.—Sewell, 1940, p. 341.—Klie, 1941, p. 29.—Nicholls, 1941, pp. 420, 422; 1942a, p. 138.—Lang, 1948, p. 960, fig. 378.—Klie, 1950, p. 111.

The geographical distribution of this species, which includes several localities in the Mediterranean, has been discussed by Lang (1948). No new localities have been recorded since.

Orthopsyllus wallini Lang, 1934

Orthopsyllus wallini Lang, 1934, p. 52, figs. 144–153.—Sewell, 1940, p. 341.—Nicholls, 1941, pp. 420, 422.—Nicholls, 1942a, pp. 137, 138.— Lang, 1948, p. 961, fig. 379 (no. 1).—Klie, 1950, p. 111.

This species is based on 2 female specimens and 1 male specimen from Brown River in Tasmania, a brackish water locality; it has not been recaptured since. The female measures about 1 mm.; the male is smaller.

Orthopsyllus major Klie, 1939

Orthopsyllus major Klie, 1939, p. 225.—Jespersen, 1940, p. 85.—Klie, 1941, p. 30, figs. 24–32.—Nicholls, 1941, pp. 420, 422.—Klie, 1950, p. 111.—Noodt, 1955, pp. 82, 83.

Based on 4 female and 2 male specimens from 2 localities along the coasts of Iceland: from Reykjavik, between the roots of laminarians, and from Seydisfjordur, in 3–9 fms. depth. The species is very near to *O. linearis* and may prove, after the study of more material, to be identical with that species. ♀ 1.3 mm.; ♂ 1.1 mm.

Orthopsyllus species Sewell, 1940

Orthopsyllus spec. Sewell, 1940, pp. 341, 360, fig. 84.—Noodt, 1955, p. 82.

Sewell (loc. cit.) described and figured a young male of *Orthopsyllus*, found in weed washings at Nancowry Harbour in the Nicobar Islands. This specimen may represent the young male of *O. rugosus* Nicholls. Length 0.89 mm.

Orthopsyllus rugosus Nicholls, 1941

Orthopsyllus rugosus Nicholls, 1941, p. 420, fig. 21; 1942a, p. 138.—Noodt, 1955, p. 82.

Based on two female specimens, length 0.81 mm., from Sellick Beach in South Australia, collected at 1 fm. depth. Not recorded since.

Orthopsyllus sarsi Klie, 1941

Orthopsyllus linearis Sars, 1909, p. 289, pl. 199.
Orthopsyllus sarsi Klie, 1941, p. 29; 1950, p. 111.

2 specimens, a male and a female, were described by Sars from Skjerstad Fjord in northern Norway, as *O. linearis*. They were recognized by Klie (1941, p. 29) as belonging to a new species and subsequently they were renamed *O. sarsi*.

Orthopsyllus littoralis Nicholls, 1942a

Orthopsyllus littoralis Nicholls, 1942a, p. 136, fig. 3.

2 females and 1 male were described and recorded by Nicholls from Rottnest Island in Western Australia. Not recorded since. ♀ 0.9 mm., ♂ 0.78 mm.

Orthopsyllus similis Nicholls, 1942a

Orthopsyllus similis Nicholls, 1942a, p. 137, fig. 4.

Described and recorded from Rottnest Island in Western Australia by Nicholls; actual number not stated. Not recorded since. As the preceding species, it was found in weed washings. ♀ 0.96 mm., ♂ 0.96 mm.

Orthopsyllus agnathus Klie, 1950

Orthopsyllus agnathus Klie, 1950, p. 108, figs. 129–133.—Noodt, 1955, pp. 82, 83.—Roe, 1958, p. 231; 1960, p. 283.

Originally described from Helgoland in Germany (Klie, 1950). ♀ 1.15 mm., ♂ 1 mm. Later recorded from the Dalkey area of County Dublin and Lough Ine of County Cork in Ireland (Roe, 1958, 1960).

Orthopsyllus psammophilus Noodt, 1955a

Orthopsyllus psammophilus Noodt, 1955a, p. 208, figs. 9–23; 1958, p. 81.

This very characteristic species was described by Noodt from interstitial water of sandy beaches at Teneriffe in the Canary Islands, where the species, which shows many adaptations to its peculiar mode of life, appears to be fairly common. It occupies a more or less isolated position among the remaining species of this genus, which generally live between algae, roots of laminarians, etc. It has not been recorded from other localities. ♀ 0.52–0.57 mm.; ♂ 0.51–53 mm.

Orthopsyllus dubius, new species

Figures 114*e–l*, 115*a,b*

Material.—Loc. 594, 1 ad. ♂, 0.56 mm.

Description.—The following is based on the above-mentioned specimen (holotype), which has been dissected and mounted.

Adult male, total length 0.56 mm.; greatest diameter 0.11 mm.; length of longest furcal seta 0.21 mm.

Body slender, cylindrical, greatest diameter at end of cephalic somite and very gradually tapering posteriorly. Frontal part of head also narrowing and at once remarkable by great development of rostrum (fig. 115*b*). No distinction between cephalothorax and abdomen; various somites of body stand out clearly because of circular constrictions of anterior parts of somites. Head and 1st thoracic somite fused to form cephalic somite, which, without rostrum, is as long as combined lengths of thoracic somites 2 to 4. Back almost straight, with small depression opposite oral aperture; sides moderately produced and rounded; oral field produced, in lateral view distinctly visible (fig. 115*a*). Rostrum notably big, plate-shaped, separated from head by shallow groove, as long as combined length of antennular segments 1 and 2, curving very slightly downward. Apex triangularly produced, extreme tip rounded. There is an incision on each side, carrying a fine hair of the frontal organ.

All somites of the body have about the same length, with the exception of the 4th thoracic and the anal somites, which are slightly longer. Anal somite slightly wider than long, with broadly rounded anal plate, placed at distal end of somite. All somites distally

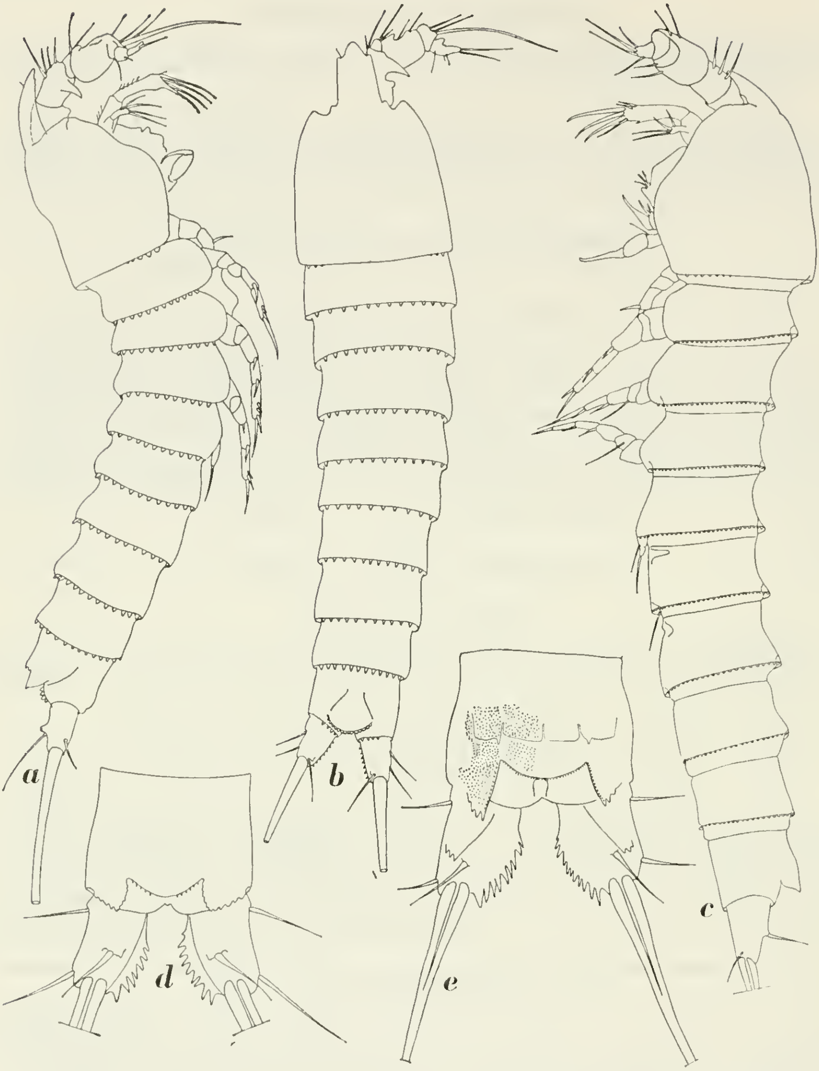

FIGURE 115.—*Orthopsyllus dubius*, new species, loc. 594, ad. ♂, holotype: *a*, whole animal, lateral view from right side; *b*, same animal, dorsal view. *Orthopsyllus pectinicauda*, new species, loc. 592, ad. ♂, allotype: *c*, whole animal, lateral view from left side; *d*, anal somite and furca, dorsal view; loc. 590, ad. ♀, holotype: *e*, anal somite and furca, dorsal view. (*a–c*, × 165; *d*, *e* × 275.)

bordered by scale-shaped teeth with rounded apex. On the cephalic somite these teeth are restricted to the lateral portion of the distal border; on the anal somite they also border the anal plate and the insertion of the furcal rami.

Furcal rami about 1½ times as long as basally broad (length 35μ, diameter at base 21μ). I could find only 3 marginal setae and 1 appendicular seta on each ramus, but this reduced setal condition may be the results of damage. One of the apical setae is greatly thickened and reaches ⅓ body length. Two remaining setae fine, inserting along external margin. Appendicular seta fine, inserting at base of fairly conspicuous apophysis, particularly visible in lateral aspect of furca. Furcal rami conical, slightly tapering, internal border set with 6–7 small spines.

Antennules short, about as long as cephalic somite, subchirocerate, 6-segmented. 2nd segment with big, acutely pointed, externally directed spine. 4th segment greatly swollen, with sensory seta in addition to smaller setae.

Antenna with unsegmented exopodite, carrying 3 setae. Oral appendages as in *Orthopsyllus linearis*; not studied in detail.

Leg 1 (fig. 114*e*) with internal and external seta on basis. Exopodite 3-segmented, endopodite 2-segmented. 1st and 2nd exopodal segments without internal setae; 3rd exopodal segment with 4 setae. 1st endopodal segment nearly as long as whole exopodite, without internal seta. 2nd endopodal segment small, with 2 setae. 2 of exopodal setae and 2 endopodal setae provided with apical brush of hairs.

Leg 2 (fig. 114*f*) with small external spiniform seta on basis. Exopodite 3-segmented, endopodite 2-segmented. 1st and 2nd exopodal and 1st endopodal segment without internal setae. 3rd exopodal segment with 3 external marginal spines and apical spine; 2nd endopodal segment with 3 setae.

Leg 3 (figs. 114*g–i*) with 3-segmented exopodites and endopodites. Exopodite as in leg 2; 1st endopodal segment small, without setae. 2nd endopodal segment drawn out in long apophysis, apex of which has a spirally curved carina. 3rd endopodal segment small, with fine internal seta and 2 apical setae, one of which is greatly lengthened (fig. 114*i*).

Leg 4 (fig. 114*j*) with 2-segmented endopodite; exopodite 3-segmented and as in legs 2 and 3. 1st endopodal segment minute, without setae; 2nd endopodal segment with 3 setae.

Exopodites of legs 2 to 4 strongly spinulose along external margin.

Leg 5 (fig. 114*k*) small, especially baso-endopodite, which carries strong internal spine and fine external seta. Exopodite well separated from baso-endopodite, about as long as greatest diameter, with total of 5 appendages: 4 small and spiniform, 1 a strongly developed, apical spine. External lobe distinct, with small seta. Leg 6 (genital plate) of reduced size, represented by small lobe, carrying single seta (fig. 114*l*). Setal formula:

	endopodite	*exopodite*
leg 1	0.2	0.0.4
leg 2	0.3	0.0.013
leg 3	(modified)	0.0.013
leg 4	0.3	0.0.013

Color faded, greenish yellow, without eye or pigmented spot being visible.

REMARKS.—This new species is very near to *Orthopsyllus linearis*, from which it differs principally by the strongly developed rostrum and the presence of a spine on the 2nd antennular segment. I am inclined to attach little importance to the larger rostrum in the present species: it may be as big as what occurs in *O. linearis;* its size in the drawings of that well-distributed species may depend largely upon curvature of the body or the rostrum. Though in the female of *O. linearis* a spine does occur on the 2nd antennular segment, the male of *O. linearis* has been described distinctly as lacking that spine. There are also slight differences in the setal formulae between the female of *O. linearis* and the present new species, but these may be due to sexual dimorphism, since, in this genus, female and male of a certain species may have slightly different setal formulae. I have been unable to lift the setal formula of the male *O. linearis* from the literature. The presence of the antennular spine particularly induced me to describe the present male as a new species though I have done so with considerable trepidation.

A single specimen of this new species was washed from sponges on coral rocks in the Ifaluk lagoon.

***Orthopsyllus pectinicauda*, new species**

FIGURES 115*c–e*, 116*a,b*, 117, 118, 121*a*

MATERIAL.—Loc. 431, 2 ad. ♀♀, 0.65 and 0.75 mm.; 1 ad. ♂, 0.73 mm. Loc. 590, 1 ad. ♀, 0.77 mm. Loc. 592, 1 ad. ♂, 0.66 mm.

DESCRIPTION.—The following is based on the female specimen from locality 590 (holotype) and on a male allotype from locality 592. Both specimens have been dissected and mounted. All remaining specimens are designated as paratypes.

Adult female (loc. 590), total length 0.77 mm.; greatest diameter 0.15 mm.; length of longest furcal seta 0.12 mm.

General shape of body elongated and slender, almost cylindrical, with greatest diameter of body at end of cephalic somite and very slightly tapering posteriorly. Division between cephalothorax and abdomen not marked by constriction but by chitinized ridges on 5th thoracic and genital somites (see below). All somites stand out

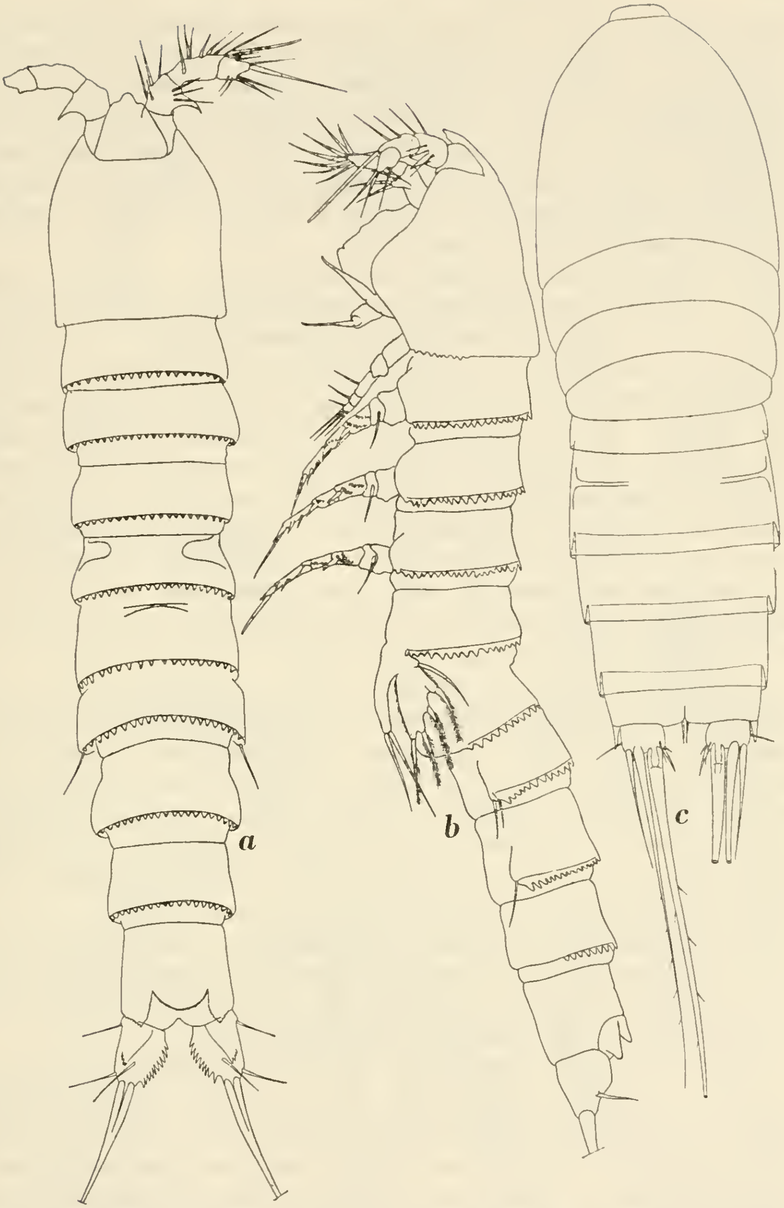

FIGURE 116.—*Orthopsyllus pectinicauda*, new species, loc. 590, ad. ♀, holotype: *a*, whole animal, dorsal view; *b*, same animal, lateral view from left side. *Nannomesochra arupinensis* (Brian), Harry Sta. 41, ad. ♀: *c*, whole animal, dorsal view. (*a*, *b*, × 165; *c*, × 275.)

clearly because of circular constrictions of somites (fig. 116*a*). Head and 1st thoracic somite fused to form cephalic somite, which, without rostrum, is as long as combined lengths of thoracic somites 2 to 4.

Back slightly curved, with distinct depression opposite oral aperture; sides greatly produced and rounded; oral field greatly protruding (fig. 116*b*). Rostrum separated from cephalic somite by shallow groove, placed in depressed part of cephalic somite, triangular, shorter than in preceding form, and reaching slightly beyond articulation between 1st and 2nd antennular segments (fig. 117*a*). Apical part laterally incised and provided with small hair on each side. Rostrum curving slightly downward, apex blunt.

The proportions of the various somites can best be taken from figure 116*a*. The 5th thoracic somite is remarkable by the presence, on each side, of an inwardly produced, highly chitinized trabecle. The fusion between 1st and 2nd abdominal somites is very incomplete and particularly is marked by the teeth bordering the distal ends of the somites (see below). 1st abdominal somite with internal, chitinous ridge, running transversally in proximal part of that somite and distinctly visible in dorsal aspect. All somites, with exception of anal somite, distally bordered by scale-shaped teeth. Along the cephalic somite these teeth occur only in the lateral parts of the body; on the abdominal somites the rows of teeth are interrupted ventrally. In lateral aspect the armature of the genital plates (leg 6) and the seta on the 3rd abdominal somite are clearly visible.

Anal somite slightly longer than broad (proportion 7:5), anal flap distinct, bordered with fine teeth, which also line insertion of furcal rami (fig. 115*e*). Whole integument, with exception of furcal rami, with curious pitted structure. On the cephalic somite the pits are circular structures, ordered in regular fields. On the remaining somites there are apparently short hairs, each placed on a small elevation of the cuticle. In the figures this very characteristic structure has been represented for only a part of the anal somite.

On each side of the anal somite, originating at the insertion of the anal plate, there is a backwardly directed carina, set with fine teeth and caudally terminating in a slightly produced, strongly denticulated flap, covering a small portion of each furcal ramus.

Furcal rami slightly longer than broad (proportion 5:4), slightly diverging, external margin smooth, internal margin with fairly broad lamella, of which the edge is strongly denticulated, 7–9 strong teeth being present. There are on each ramus 3 marginal setae and 1 appendicular seta. Apical seta strongly thickened and lengthened; 2 setae are placed along external border, while appendicular seta inserts at base of a low carina, running longitudinally across each ramus, which carries a few caudal spinules.

Antennules (fig. 117*a*) short, ⅔ length of cephalic somite, 4-segmented, segment 2 with strong, externally directed spine. Segment 3 fairly long, with short conical process carrying aesthetasc and 2 setae.

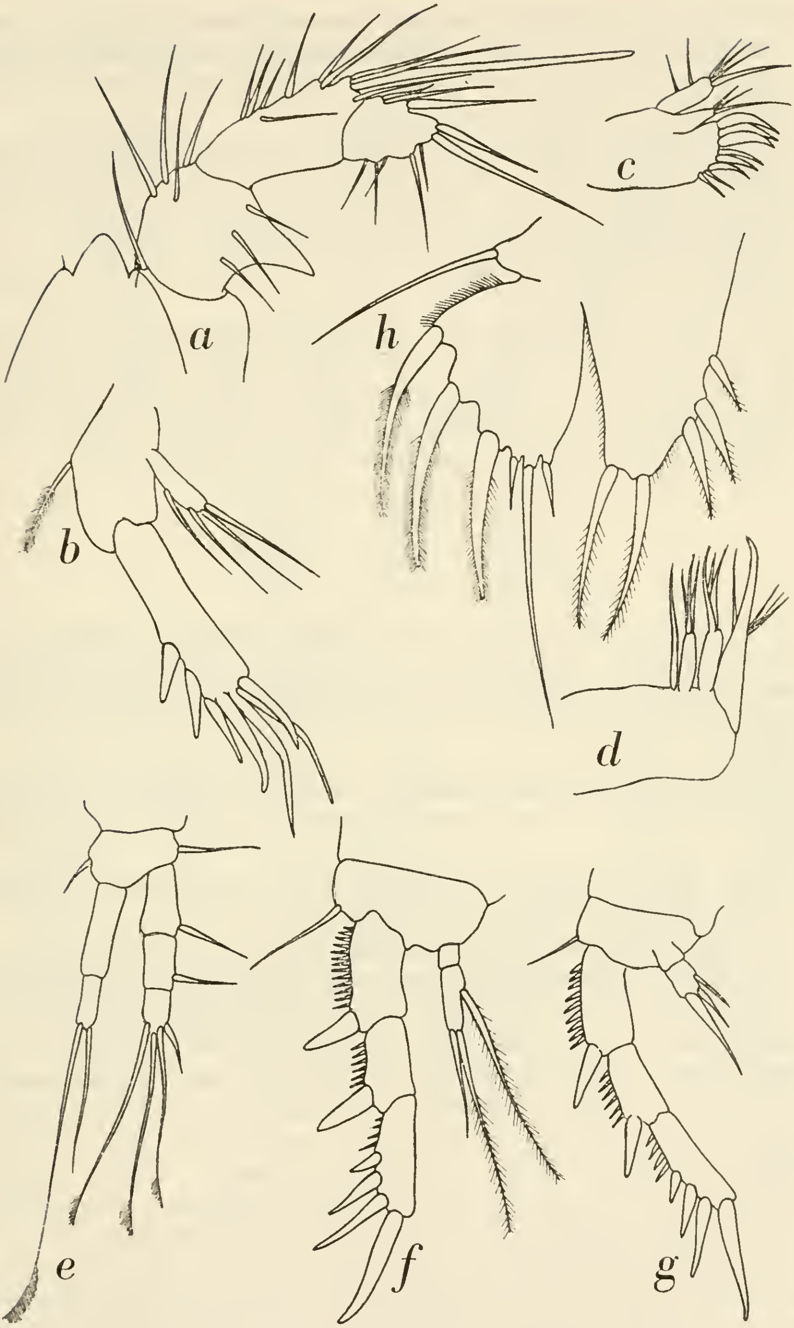

Figure 117.—*Orthopsyllus pectinicauda*, new species, loc. 590, ad. ♀, holotype: *a*, rostrum and right antennule, dorsal view; *b*, antenna; *c*, maxillule; *d*, maxilla; *e*, leg 1; *f*, leg 2; *g*, leg 4; *h*, leg 5. (× 520.)

4th segment with strong apical seta; external margin with 2 fine setae.

Antenna (fig. 117*b*) with styliform, unsegmented exopodite, carrying 4 setae. Allobasis with single seta opposite insertion of exopodite. Endopodite with total of 7 appendages.

Oral appendages identical with those of *Orthopsyllus linearis* and not described in detail here. Maxillule and maxilla, which have the same number of setae as in that species, are figured here (figs. 117*c,d*). On the maxilla there are only 3 endites and an additional seta.

Leg 3 was damaged during dissection with the result that I cannot describe its structure.

Leg 1 (fig. 117*e*) almost as in previous species, but 1st endopodal segment slightly shorter, no internal seta. 3rd exopodal segment with 4 appendages. 1 of setae of endopodite and 3 of setae on exopodite are provided with terminal brush. The particulars of legs 2 and 4 appear from figures 117*f,g* and from the setal formula:

	endopodite	*exopodite*
leg 1	0.020	0.0.121
leg 2	0.120	0.0.013
leg 4	0.120	0.0.013

Leg 5 (fig. 117*h*) with well-developed exopodite, separate from baso-endopodite. Exopodite more or less triangular, as long as greatest diameter, with total of 6 appendages, 2 of which are small. Baso-endopodite as long as exopodite, with 2 apical and 3 internal setae.

Color horny yellowish, probably considerably faded in alcohol. Chitinized area on cephalothorax greenish, probably representing eye.

Adult male (loc. 592), total length 0.66 mm.; greatest diameter 0.15 mm.; length of longest furcal seta 0.14 mm.

General shape of body as in *O. dubius*, with same cylindrical appearance; various somites stand out even more clearly by stronger circular constrictions (fig. 121*a*). Head and 1st thoracic somite fused; cephalic somite as long as combined lengths of thoracic somites 2 to 4, laterally only moderately produced. Back sinuous; rostrum exactly as in female, notably shorter and with broader base than in *O. dubius*, slightly downwardly curved, apex more rounded (fig. 115*c*). Somites of body of nearly same length, anal somite excluded. Epimeral plates of thoracic somites 2 to 4 moderately produced, rounded. All somites, as in female, bordered with scale-shaped teeth, smaller and more numerous than in female, forming completely closed rows on abdominal somites. Armature of 6th legs (genital plates) and 2nd abdominal somite distinctly visible in lateral aspect. Anal somite and furcal rami as in female, but carina on rami less prominent and no big caudal teeth, caudal border being provided with small teeth (fig. 115*d*).

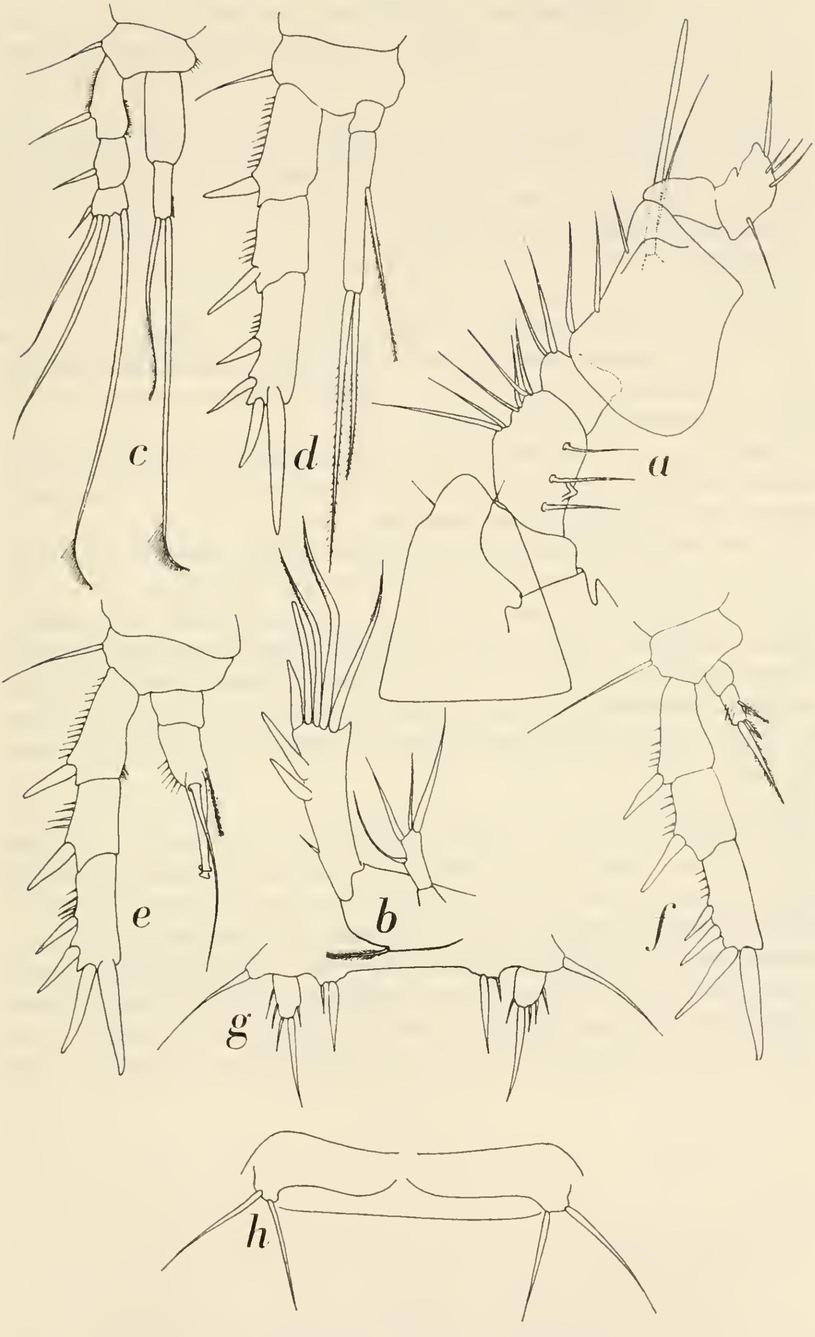

FIGURE 118.—*Orthopsyllus pectinicauda*, new species, loc. 592, ad. ♂, allotype: *a*, rostrum and right antennule, dorsal view; *b*, antenna; *c*, leg 1; *d*, leg 2; *e*, leg 3; *f*, leg 4; *g*, 5th legs; *h*, 6th legs. (× 520.)

The carapace has the same pitted structure that is observed also in the female; the cephalic somite, in the region of the oral aperture, has a circular hyaline patch in the integument, probably indicating the position of the eye.

Antennules slightly longer than in female, 6-segmented, subchirocerate. No tooth on segment 2, but small, rounded chitinized tubercle; segment 4 big and strongly swollen; apical 2 segments flattened. Setation represented in figure 118*a*.

Structure of antenna and mouth parts as in female, not described in detail here.

There are certain small differences in the structure of the legs (figs. 118*c–f*) though they have the same setal formula as in the female.

2nd endopodal segment of leg 2 greatly lengthened; internal seta short and strongly haired (fig. 118*d*).

Apophysis of 2nd endopodal segment of leg 3 short, differing in small details from that of *O. dubius*; external border of 2nd endopodal segment with long spiniform hairs (fig. 118*e*).

2nd endopodal segment of leg 4 with long hairs, obscuring presence of 2 setae. Apical seta short, densely haired (fig. 118*f*).

5th legs (fig. 118*g*), as comparison of figures will show, hardly different from those of *O. dubius*. Baso-endopodite scarcely elevated, with strong internal and fine external seta. Exopodite well separated from baso-endopodite, with 5 appendages, one of which is strong apical seta. Armature of genital plates composed of 2 setae on each side (fig. 118*h*).

Color as in female.

REMARKS.—This new species approaches *O. similis* Nicholls, 1942a, in many respects, particularly in the furcal structure and the shape of leg 5. There are small differences in setal formulae and no scales appear to occur along the somites in *O. similis*. The furcal structure and the peculiar, pitted structure of the carapace make the recognition of this new species fairly easy. It was washed from caulerpas from the reef ridge at Falarik and found in two sand samples taken at various distances from the reef margin at Falarik in the Ifaluk Atoll.

Nannomesochra arupinensis (Brian, 1925)

FIGURES 116*c*, 119

Mesochra arupinensis Brian, 1923, p. 130 (nomen nudum).
Mesochra arupinensis Brian, 1925, p. 20, figs. 8–16.
Nannomesochra arupinensis.—Lang, 1948, p. 1189, fig. 474.—Noodt, 1953, p. 16, figs. 37–41; 1955a, p. 212; 1957, p. 154.—Roe, 1960, p. 283.
Pseudomesochra parvula Gurney, 1927, p. 543, fig. 153.
Mesochra armoricana Monard, 1935a, p. 58, pl. 10 (fig. 144) (male only).

MATERIAL.—Harry Sta. 41, 1 ad. ♀, 0.35 mm.

DESCRIPTION.—The following is based on the only female specimen available, which has been dissected and mounted.

Adult female, total length 0.35 mm.; greatest diameter 0.12 mm.; length of longest furcal seta 0.15 mm.

Body more or less spindle-shaped, not unlike condition found in *Ectinosoma*, with elongated, ovoid cephalothorax and cylindrical abdomen; both regions of body distinctly separate (fig. 116*c*). Greatest diameter of body at end of cephalic somite, anteriorly and posteriorly narrowing. Anterior part of body rounded and not obtuse as appears in drawings of this species from Atlantic or Mediterranean localities. Cephalothorax and abdomen of nearly equal length. Head and 1st thoracic somite fused. Length of cephalic somite equal to that of thoracic somites 2 to 4 combined. Rostrum small, triangular plate with fairly broad base, visible dorsally between antennular bases, and rounded apex, pointing obliquely downward and forward, separated from cephalic somite by shallow groove. Thoracic somites 2 to 4 of equal length, distal margins smooth. 5th thoracic somite narrow, present as narrow collar at beginning of abdomen.

Abdominal somites strongly contracted in this specimen. Genital somite composed of fused somites 1 and 2, 1½ times as broad as long, line of fusion distinctly visible dorsally. Somites 3 and 4 of equal length, each ⅔ length of genital somite, distal margins smooth. Anal somite shorter than either 3 or 4, anal plate invisible. Spinules occur on each side of furcal insertion. Furcal rami twice as broad as long, parallel, with 4 marginal setae and 1 appendicular seta. Setae 1, 5, and appendicular seta small and fine, seta 1 at end of internal margin, seta 5 halfway along external margin. Appendicular seta placed at internal distal corner of each ramus. Setae 2, 3, and 4 lengthened, especially 2nd and 3rd, which also have some dispersed spinules. Some spinules occur on furcal rami near insertion of seta 1.

Antennules very short, 7-segmented. Segment 2 big, with transverse row of spinules. Segment 4 with small conical process, bearing short aesthetasc and 1 seta. Setation represented in figure 119*f*.

Antenna with allobasis; exopodite small, 1-segmented, styliform. Endopodite with 8 marginal spines and setae, distribution of which appears from figure 119*g*.

The oral parts have been compared with Gurney's description and figures with the result that I found a difference only in the structure of the maxillule; it has a small exopodite with 2 setae which apparently had been overlooked previously.

Leg 1 (fig. 119*a*) with 3-segmented exopodite and endopodite; legs 2 to 4 with 2-segmented endopodites and 3-segmented exopodites. The details of these legs appear from figures 119*b–d*, the setal formula is:

	endopodite	*exopodite*
leg 1	1.1.020	0.0.112
leg 2	1.221	0.1.123
leg 3	1.211	0.1.223
leg 4	1.211	0.1.223

All feet strongly spinulose at bases and external margins of exopodites.

Endopodite of leg 1 also with fine, long spinules, which may easily be mistaken for short setae.

Leg 5 (fig. 119*e*) with small, circular exopodite, bearing 5 marginal setae. Baso-endopodite of about same length as exopodite, with 4 strong setae and 2 (internal) dagger-shaped spines; baso-endopodites of both sides fused in median plane. The dagger-shaped spines are a very prominent feature in the present specimen but, judging from the figures in the literature, they appear to vary considerably in size.

Color completely faded, transparently whitish. No eye or pigmented spots visible.

REMARKS.—The distribution of this species, which lives under purely marine as well as under brackish water conditions, has been discussed by Lang (1948, p. 1189). To these localities may be added: Lake Fasten on Fehmarn Island, and Kiel Firth, Germany, in the Baltic (Noodt, 1953: ♀ 0.6 mm., ♂ 0.47 mm.); Lough Ine of County Cork, Ireland (Roe, 1960); and Teneriffe in the Canary Islands (Noodt, 1955a). The present specimen originates from the alga *Microdictyon* collected at 35–40 ft. depth in the lagoon at Falarik in the Ifaluk Atoll.

Family Lourinidae Monard, 1927

For reasons to be described below (p. 312), I have kept this family separate from the Canthocamptidae; as appears from Noodt's arguments (1955a, p. 213), they are related but, in my opinion at least, quite distinct.

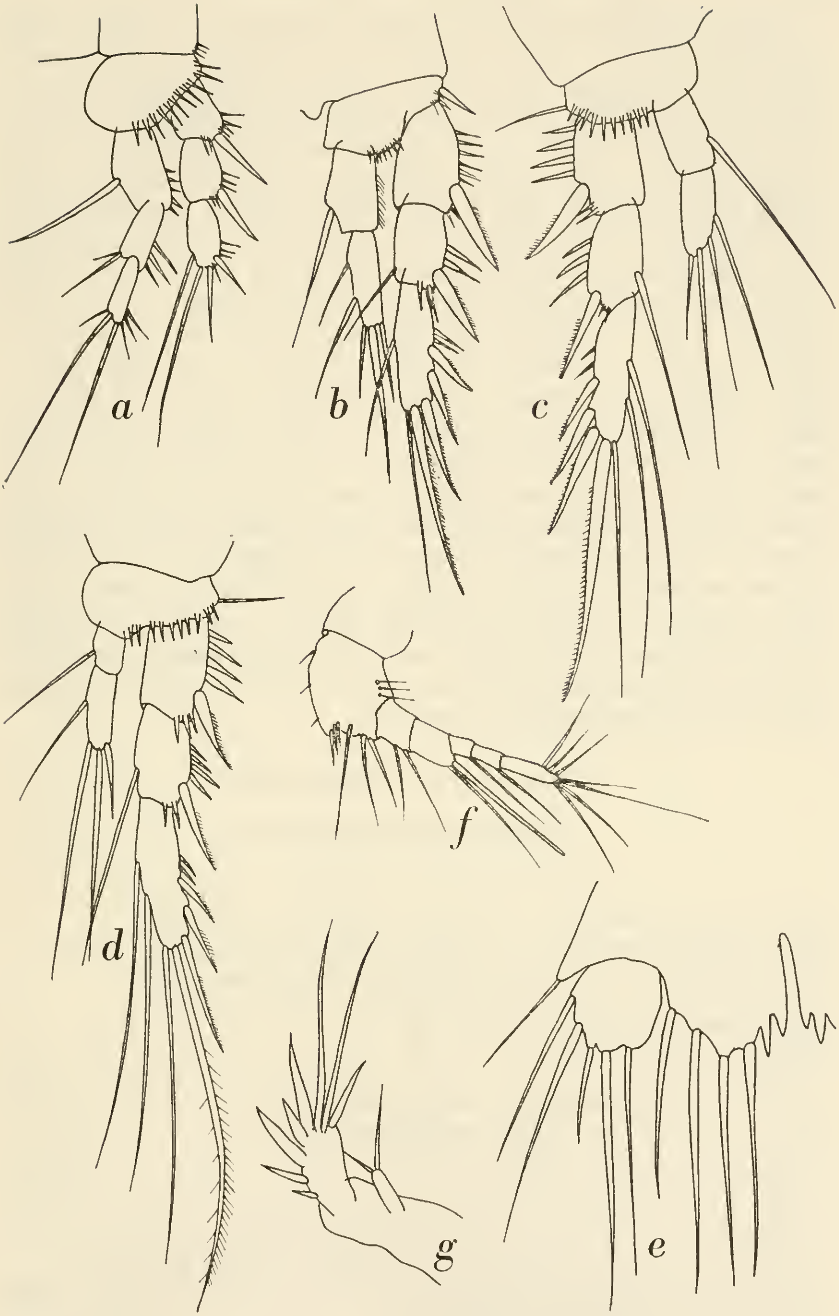

FIGURE 119.—*Nannomesochra arupinensis* (Brian), Harry Sta. 41, ad. ♀: *a*, leg 1: *b*, leg 2; *c*, leg 3; *d*, leg 4; *e*, leg 5; *f*, antennule; *g*, antenna. (× 625.)

The nomenclature of its only genus, *Lourinia* C. B. Wilson, 1924, is slightly complicated, but there can be no doubt, as may appear from the following argument, that its proper name should be what is given here. The type species of the genus was described originally by Claus (1866, p. 24) as *Jurinia armata* and independently by Thompson and A. Scott (1903, p. 265) as *Ceylonia aculeata.* Both species are congeneric and, in the opinion of most copepodologists, also identical; both generic names are preoccupied, as was recognized by Wilson (1924, pp. 14, 15); since he failed to notice the fact that *Jurinia* and *Ceylonia* are congeneric, he substituted a new generic name for both, *Ceyloniella* for *Ceylonia* (p. 14) and *Lourinia* for *Jurinia* (p. 15). Although *Ceyloniella* has distinct page priority over *Lourinia,* the proper name, according to the International Rules of Zoological Nomenclature (cf. Follett, 1955, p. 37), is that used by the first reviser (i.e., Monard, 1927, p. 173); the type species, consequently, must be named *Lourinia armata* (Claus, 1866). Specimens occur in the Ifaluk collection that, although slightly different in setal formulae from previously described specimens, must in my opinion be brought to that species. A second species recently has been added to *Lourinia* by Sewell (1940, p. 332) as *Ceyloniella nicobarica*; of this new species an unnamed variety also was described. The characters separating this new species from the variable *Lourinia armata* are not particularly impressive.

Genus *Lourinia* Wilson, 1924

Lourinia armata (Claus, 1866)

FIGURES 120, 121*b–d*, 122–124

Jurinia armata Claus, 1866, p. 25, pl. 2 (figs. 15–24).
Ceylonia aculeata Thompson and A. Scott, 1903, p. 265, pl. 7 (figs. 11–23).
Ceylonia aculeata var. *adriatica* Brian, 1923, p. 130 (nomen nudum).
Ceyloniella aculeata var. *adriatica* Brian, 1928, p. 23, figs. 100–104.
Ceylonia armata.—Vàtova, 1928, p. 183.
Ceyloniella armata.—Sewell, 1940, pp. 124, 125, 127, 130, 360, 363, 366, 367, 368, 375.
Ceyloniella armata f. *major* Sewell, 1940, p. 329, figs. 77, 78.
Ceyloniella armata f. *minor* Sewell, 1940, p. 331, fig. 79.
Lourinia armata.—Lang, 1948, p. 1215, fig. 490.—Noodt, 1955a, p. 212, fig. 24.—Petkovski, 1955a, p. 100, fig. 70.
Lourinia armata sulamericana Jakobi, 1954a, p. 192, pl. 3.

MATERIAL.—Loc. 592, 1 ad. ♀, 0.99 mm.; 1 ad. ♂, 0.87 mm.

DESCRIPTION.—The following is based on the above-mentioned specimens; both have been dissected.

General shape of body slender, cylindrical, with fairly well-marked division between cephalothorax and abdomen, greatest diameter at

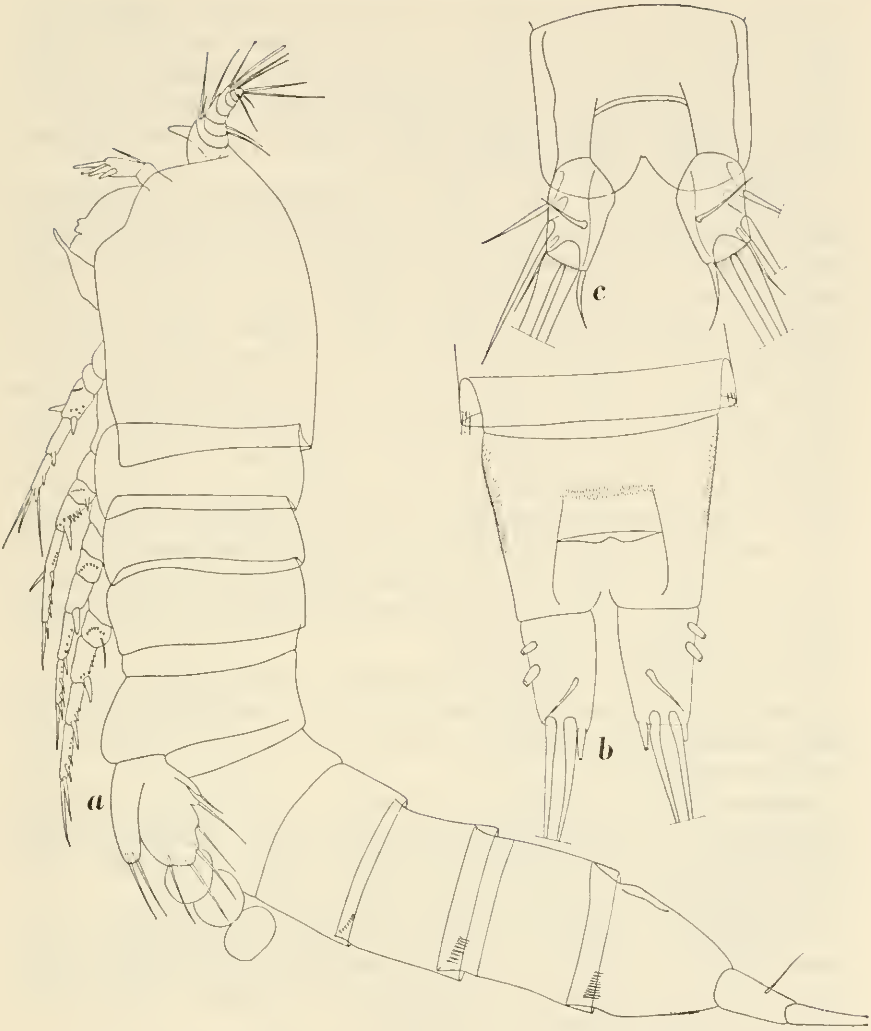

Figure 120.—*Lourinia armata* (Claus), loc. 592, ad. ♀: *a*, whole animal, lateral view from left side; *b*, same animal, distal part of abdomen and furca, dorsal view; ad. ♂: *c*, anal somite and furca, dorsal view. (*a*, × 165; *b*, *c*, × 275.)

middle of cephalic somite, very gradually narrowing posteriorly, anterior portion of cephalothorax broadly rounded (fig. 121*c*). Head and 1st thoracic somite fused to form cephalic somite, which is as long as combined lengths of thoracic somites 2 to 4. Back in lateral aspect gently rounded and curving into big rostrum, sides slightly produced to shield oral appendages (fig. 120*a*). Rostrum curved, triangular plate with rounded apex and broad base, bordered by hyaline membrane and at apex with 2 hairs placed each in a pit (fig. 122*d*). Base distinctly visible in dorsal aspect as rounded tubercle in front of head, separated from cephalic somite by shallow groove. Thoracic somites 2 to 4 of equal length, epimeral plates well produced, rounded, slightly backwardly produced.

Abdomen of nearly same length as cephalothorax. 5th thoracic somite prominent in both lateral and dorsal aspects. Genital somite resulting from fusion of abdominal somites 1 and 2, line of fusion very distinct on lateral and dorsal surfaces of genital somite. 3rd and 4th abdominal somites of about same length, each ¾ length of genital somite. Patches of spinules occur on ventrolateral surfaces of 2nd, 3rd, and 4th abdominal somites. Anal somite slightly longer than 3rd or 4th somite, slightly tapering, with big, almost straight, hyaline anal flap, sunken into dorsal surface of anal somite and bordered by two walls (fig. 120*b*). Lateral parts of anal somite haired. Furcal rami conical, about 1½ times as long as wide, parallel. Each ramus has 5 marginal setae and 1 appendicular seta; setae 1, 3, 4, 5, and appendicular seta apparently fine, but damaged in my specimen; seta 2 on each side greatly lengthened and thickened, apical part missing on both sides.

Antennules short, half length of cephalic somite, 7-segmented. 1st segment big, with small internal spine. 4th segment small, with short conical process bearing aesthetasc and seta. Setation represented in figure 122*d*.

Antenna (fig. 122*e*) short and powerful. Coxa short, with single external seta. Allobasis short, with internal seta. Exopodite small, represented by conical process, carrying 2 setae. Endopodite composed of single short segment, with 6 strong spines.

Mandible (fig. 122*f*) with narrow praecoxa, cutting edge with 2 rounded teeth. Palp well developed, basipodite cylindrical. Exopodite not sharply separated, unsegmented, with 3 setae. Endopodite coalescent with basipodite, with 2 setae.

Maxillule (fig. 122*g*) small; arthrite well developed, with 5 curiously modelled, flattened teeth. Basopodite, endopodite, and exopodite coalescent, forming small lobe with 4 setae, almost obscured by big endite, which carries 4 setae.

Maxilla (fig. 122*h*) with small praecoxal and small coxal endite, each with 3 setae. Basal endite bigger, with strong, curved spine, coalescent with endite, bearing one additional seta.

Maxillipede strongly reduced, completely fused to chitinized ridges of oral field, and nonarticulating. It is more or less triangular and carries 2 small apical setae.

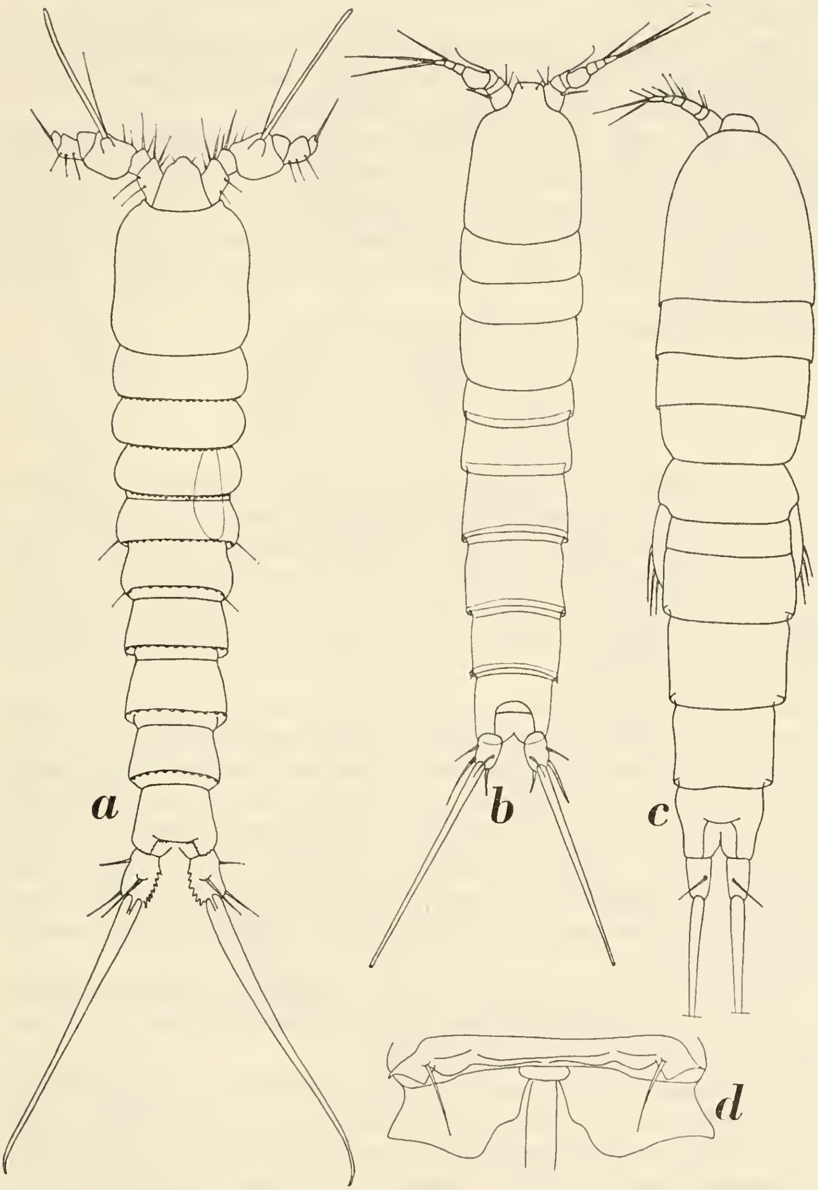

Figure 121.—*Orthopsyllus pectinicauda*, new species, loc. 592, ad. ♂, allotype: *a*, whole animal, dorsal view. *Lourinia armata* (Claus), loc. 592, ad. ♂: *b*, whole animal, dorsal view; ad. ♀: *c*, whole animal, dorsal view; ad. ♀ : *d*, genital somite, ventral view. (*a–c*, × 100; *d*, × 460.)

Legs strongly developed, and very spinuous. The various details appear clearly in figures 122*a–c*, 123*a*; the following points need special mention.

Legs 1 to 4 with 3-segmented exopodites and 2-segmented endopodites. Bases of all feet with fine external seta and rows of spinules bordering insertion of exopodite and endopodite.

Leg 1 (fig. 122*a*). Basis with strong spine near insertion of endopodite. 1st and 2nd segment of exopodite with very strong external marginal spine. 3rd exopodal segment with 2 spines and 2 setae. 1st endopodal segment with brush-shaped internal seta. 2nd exopodal segment with strong, conical apical spine, and 2 internal, spiniform setae.

Legs 2 to 4 have the following setal formula:

	endopodite	*exopodite*
leg 2	1.311	0.1.023
leg 3	1.221	0.1.123
leg 4	1.121	0.1.123

Leg 2. Internal seta on 1st endopodal segment spiniform. 3 spines occur along external margin of 2nd endopodal segment (fig. 122*b*).

Leg 3. Internal seta at 1st endopodal segment spiniform. 2nd endopodal segment with 2 internal setae but with slight notch between insertion of these setae that may have carried a third seta which is absent, nevertheless, on both sides. External margin of that segment with 3 spines (fig. 122*c*).

Leg 4. Internal seta on 1st endopodal segment spiniform. 2 spines occur at external border of segment 2 of endopodite (fig. 123*a*).

Leg 5. Baso-endopodites of both sides fused, each side with 4 setae and 2 haired (internal) spines. Exopodites spatulate, ovoid, slightly longer than wide, reaching slightly beyond baso-endopodite, with 5 marginal setae. Exopodite and baso-endopodite with canaliculated structure. External lobe lengthened, with fine seta. The actual structure of leg 5 appears best in figure 123*b*. Genital field represented in figure 121*d*.

Color greenish, strongly faded. No eye or pigmented spot visible.

Adult male, total length 0.87 mm.; greatest diameter 0.15 mm.; length of longest furcal seta 0.41 mm.

General shape of body as in female, cylindrical, with division between cephalothorax and abdomen indistinctly marked (fig. 121*b*). As in female, head and 1st thoracic somite fused and of same length; 4th thoracic somite longer. Rostrum as in female, surrounded by hyaline membrane and with 2 fine hairs each placed in circular pit. 1st and 2nd abdominal somites separate; 1st fairly short. All abdominal somites with distal hyaline lamella and some small, laterodorsal teeth on their distal portion, particularly visible in lateral aspect.

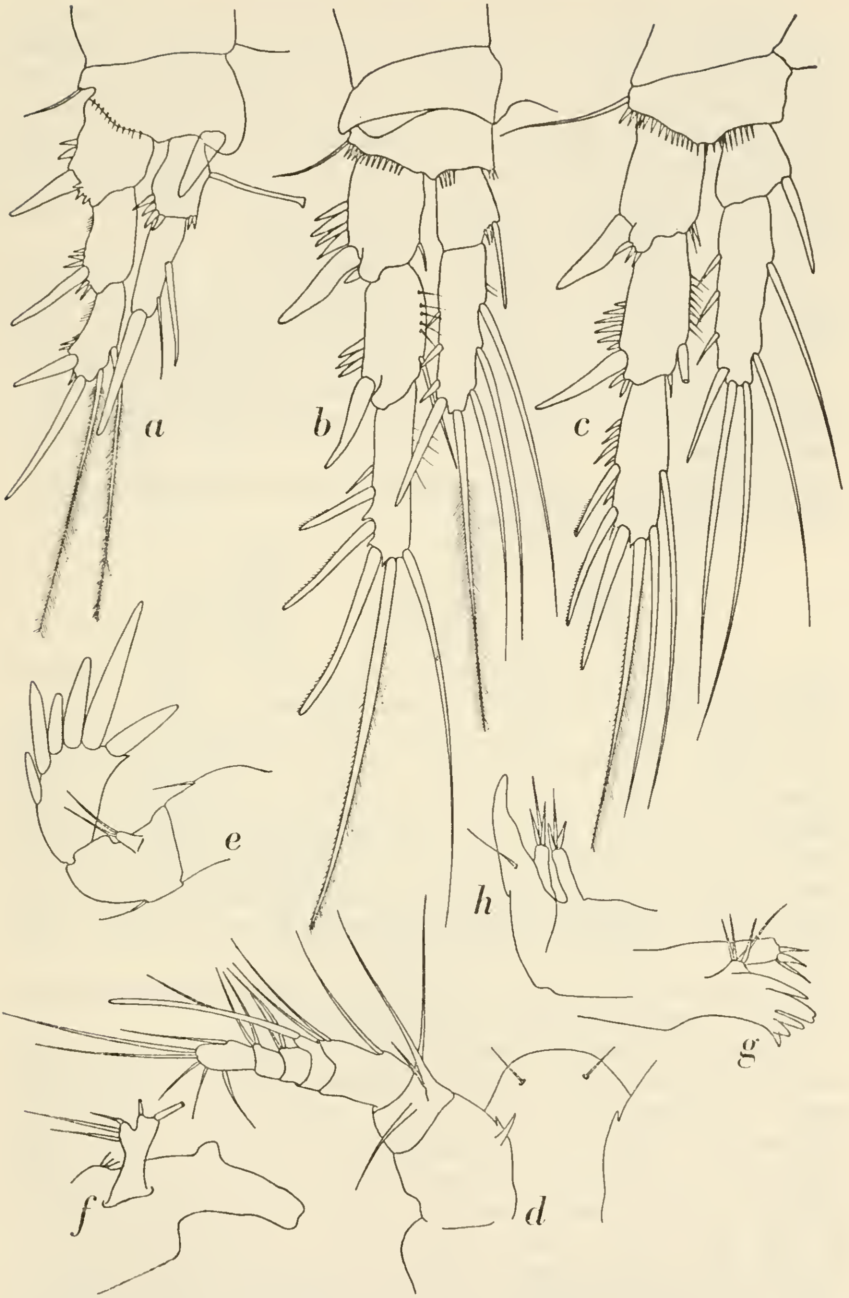

Figure 122.—*Lourinia armata* (Claus), loc. 592, ad. ♀: *a*, leg 1; *b*, leg 2; *c*, leg 3; *d*, rostrum and left antennule, dorsal view; *e*, antenna; *f*, mandible; *g*, maxillule; *h*, maxilla. (× 460.)

Anal somite (fig. 120*c*) about as long as wide, slightly longer than 4th abdominal somite; anal plate as in female placed in depressed part of somite, broadly rounded and with smooth hyaline lamella. Caudal rami 1⅓ as long as greatest diameter, conical; insertion at anal somite fringed with spinules. Setation of each ramus as in female, but here setae are undamaged; setae 1, 3, 5, and appendicular seta short, 2nd greatly lengthened and 3rd of intermediate length. Seta 2 at its insertion in furcal ramus fringed with hairs.

Antennules short, ¾ length of cephalic somite, 7-segmented, subchirocerate, 4th segment strongly swollen with big conical process bearing aesthetasc and 2 setae. Distal 3 segments much smaller, forming hinge with 4th segment. Setation represented in figure 123*d*.

Antenna and mouth parts as in female, with exception of mandibular praecoxa, which has 2 fairly well-developed teeth along cutting edge.

The legs, which have all been figured, have a setal formula slightly different from that of the female:

	endopodite	*exopodite*
leg 2	1.311	0.1.123
leg 3	1. (modified)	0.1.123
leg 4	1.121	0.1.123

Leg 1 (fig. 124*a*). Insertion of apical spine on 2nd endopodal segment bordered with rather coarse spinules.

Leg 2 (fig. 124*b*). Spinules along external margin of exopodite very strongly developed. Internal seta at 3rd segment of exopodite.

Leg 3 (fig. 124*c*). Exopodite as in female. Endopodite 3-segmented; 1st segment with short, spiniform internal seta. 2nd segment very short but terminating in internal, curved apophysis, at base of which a plumose seta. 3rd segment conical, its apex reaching articulation between exopodal segments 2 and 3, with 2 apical setae.

Leg 4 (fig. 123*c*). Spinulation of external exopodal margin strongly developed. Seta at external basis of margin fine.

Exopodite and baso-endopodite of leg 5 fused, legs of both sides also fused, separated by shallow V-shaped incision. External lobe more or less free, carrying strong seta. There are, on each half of the complex, 9 setae: an external group of 6, one of which is very strong, and apparently belonging to the exopodite, and an internal group of 3. The setae correspond with a canaliculated system in the legs that shows a certain resemblance to the one found in the female. The exact structure of leg 5 appears from figure 124*d*.

The genital plates (leg 6) are small lobes along the ventral part of the 1st abdominal somite, each carrying 3 fine setae (fig. 124*e*).

Color as in female.

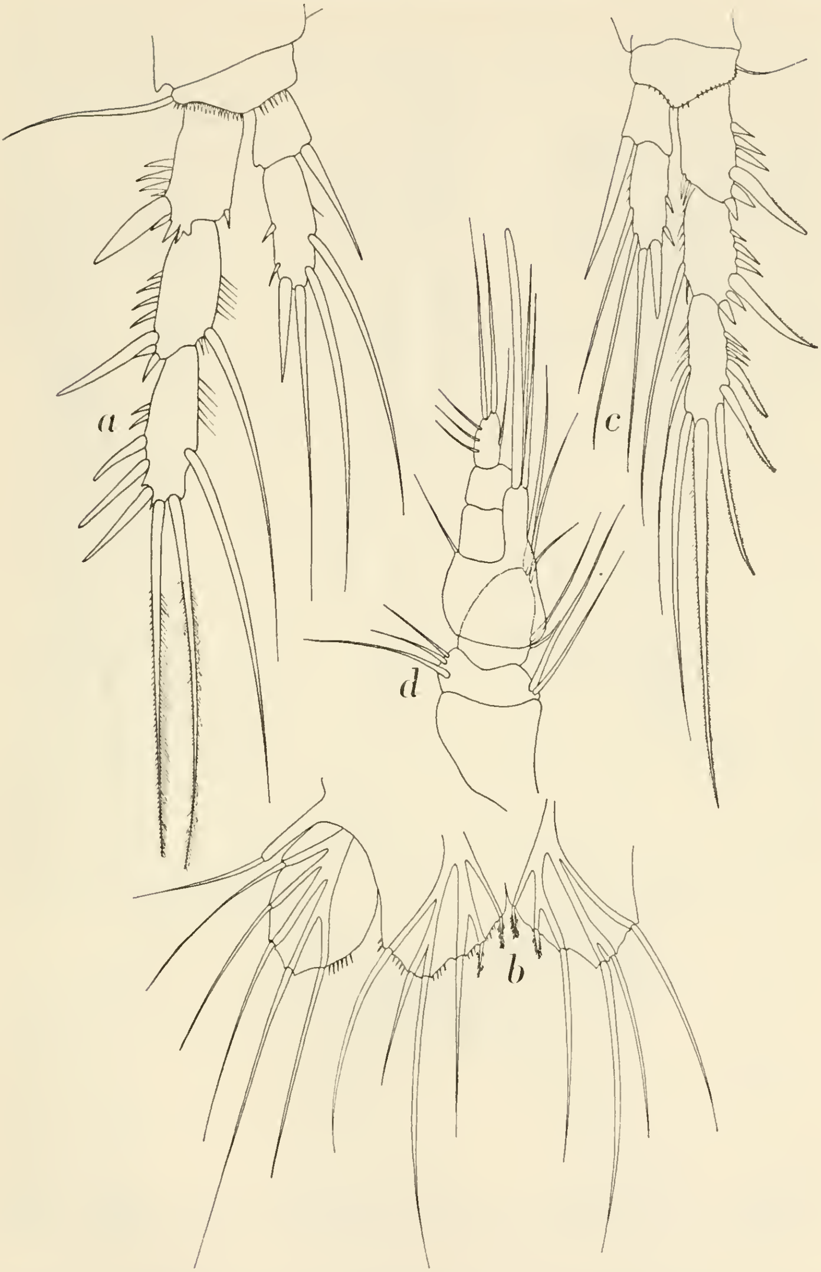

FIGURE 123.—*Lourinia armata* (Claus), loc. 592, ad. ♀: *a*, leg 4; *b*, leg 5; ad. ♂: *c*, leg 4; *d*, antennule. (*a*, *c*, *d*, ×460; *b*, × 275.)

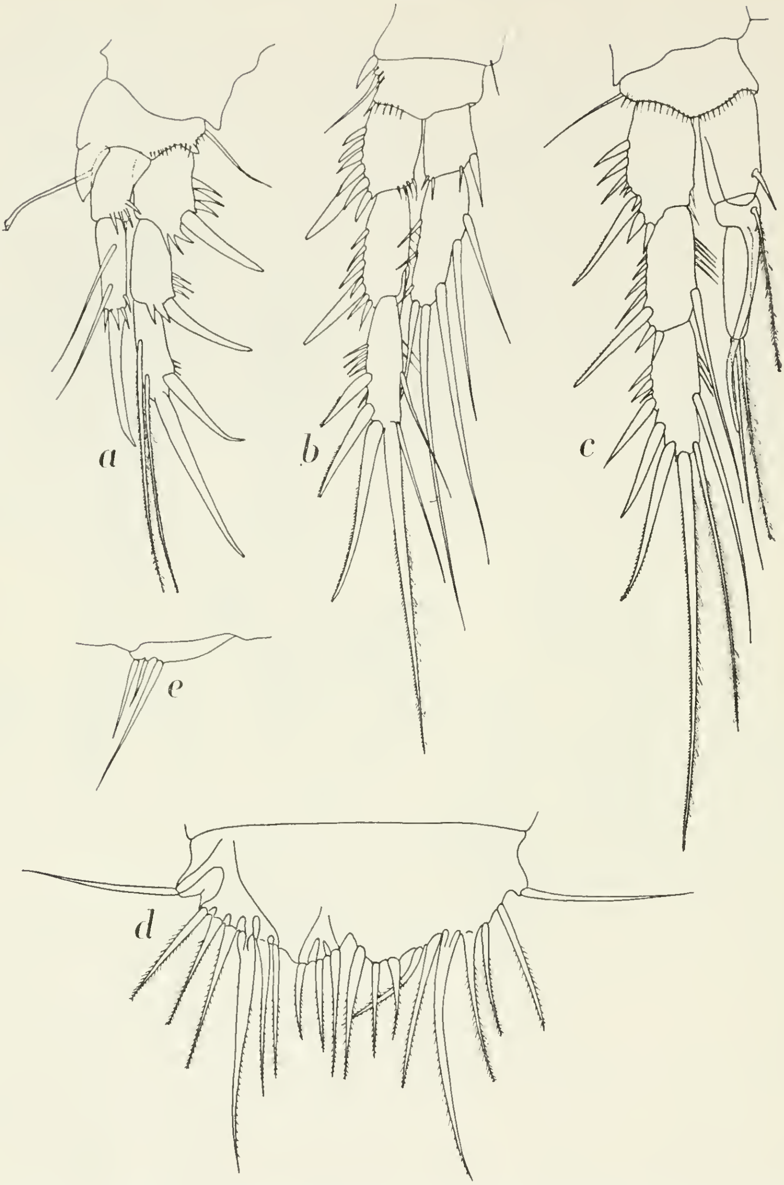

Figure 124.—*Lourinia armata* (Claus), loc. 592, ad. ♂: *a*, leg 1; *b*, leg 2; *c*, leg 3; *d*, 5th legs; *e*, leg 6. (× 460.)

Remarks.—Though the present species, in the structure of the genital field in the female, particularly the seminal receptacle, shows a great resemblance with the Canthocamptidae, there are quite a number of points (structure of the antennae, oral parts, reduction of maxillipedes, structure of the furca) which set it apart from the genera now included in that family and it seems advisable to retain, at least for the present, the family Louriniidae to include this aberrant species and its allies. The variability in *Lourinia armata*, especially in the structure of the furcal setae and leg 5, is fairly wide, although probably less wide than may appear from a first impression of the various drawings published. The two median setae of the baso-endopodite in the female are now figured as haired setae, now as lancet-shaped spines. This, in a statement, seems quite an important difference, but practice shows that it is extremely difficult at times to discern from a slide containing a dissected leg what is actually present; some of the differences found in the literature may be the result of somewhat hasty observations. A wide conception of the limits of the species *L. armata* therefore seems justified. I see no reason at all for the subspecific distinction of *L. a. sulamericana* Jakobi, 1954, and I have sunk it into the synonymy of the present species. All characters enumerated by Jakobi also apply to the European representatives of this species as well as to the specimens described here. Jakobi apparently has included the spines on the endopodite among the setae, which accounts for the differences between his table on p. 194 with the setal formulae given in other, and the present, descriptions. The two forms, into which the present species was split by Sewell (1940), *Ceyloniella armata* f. *major* and *Ceyloniella armata* f. *minor*, are separated mainly by differences in length; the structural differences are so very slight that they are almost on the level of individual variations. I have not accepted Sewell's forms, the more so since a considerable difference in lengths is found in the various specimens so far recorded. Table of measurement (in mm.):

author	*locality*	*females*	*males*
Claus, 1866	Mediterranean	1.05–1.15	
Thompson and A. Scott, 1903	Ceylon pearl oyster banks	1.2	1.0
Brian, 1928	Aegean Sea	0.95–1.2	0.95
Willey, 1930	Bermuda	0.8	0.8
Monard, 1935a	Mediterranean	0.84–1.1	
Sewell, 1940	Nicobar Islands	0.691–1.013	
Nicholls, 1941	South Australia	0.93–1.32	1.02–1.23
Noodt, 1955a	Teneriffe Island	0.82	0.82
Jakobi, 1954	Brazilian coast	1.0	0.9

As may also appear from the table given below, the Ifaluk specimen has a setal formula that differs in some respects from those given in the literature. I am inclined not to attach too much importance to this difference since a small difference in setation also is found in other variable Harpacticoids.

locality	*leg 2*		*leg 3*		*leg 4*	
	endopodite	exopodite	endopodite	exopodite	endopodite	exopodite
Southern Australia (Nicholls, 1941)	1.331	0.0.123	1.321	0.1.123	1.211	0.1.123
Teneriffe Island (Noodt, 1955a)	1.321	0.1.123	1.221	0.1.123	1.121	0.1.123
Ifaluk, female	1.311	0.1.023	1.221	0.1.123	1.121	0.1.123
Ifaluk, male	1.311	0.1.123	1.(modified)	0.1.123	1.121	0.1.123

The geographical distribution of this species includes areas in the tropical and subtropical Atlantic and in the Indian and western Pacific. To the localities cited by Lang (1948, p. 216) the following may be added: Teneriffe in the Canary Islands (Noodt, 1955a); Split Channel, Yugoslavia, in the Adriatic (Petkovksi, 1955a); Port Denison in Western Australia (Nicholls, 1945); Sellick Beach in Southern Australia (Nicholls, 1941); Nancowry Harbour in the Nicobar Islands, and Addu Atoll in the Maldive Archipelago (Sewell, 1940).

Family Laophontidae T. Scott, 1904

A discussion of the various genera over which the many species of this family can be distributed has been published independently by Nicholls (1941b) and Lang (1944, 1948); they have used widely different characters to distinguish between the various genera.

Nicholls, in addition to the genera of Laophontidae which had been introduced prior to his revision, has described the new genus *Echinolaophonte*, for which no type has been indicated,* and he has divided the genus *Laophonte* into several subgenera: *Laophonte* sensu stricto, type species *L. cornuta* Philippi; *Mesolaophonte*, type species *L. littoralis* T. and A. Scott; *Metalaophonte*, type species *L. depressa* T. Scott; *Neolaophonte*, type species *L. trilobata* Willey; and *Monolaophonte*, type and sole species *L. curvata* van Douwe. Nicholl's division of *Laophonte* is based exclusively on characters of the female; the exact limits of this subgenera, which might well be raised to generic rank, consequently are arbitrary.

Lang's genera are more clearly defined; moreover, his system of subdivision of the Laophontidae is based on characters of both females and males. I propose here to follow Lang's divisional system definitely and, because of the insufficient characterization, to abolish the subgenera introduced by Nicholls, thereby giving a more official base to the course followed by most investigators since the publication of Lang's monograph. A highly complicated problem would arise if Nicholls' subgenera should be accepted and raised to generic level; a completely new system of the Laophontidae, including redefinitions of Nicholls' and some of Lang's genera, would have to be published. An exception probably can be made for *Echinolaophonte* Nicholls, 1941b, if a type for this genus is indicated by its author.*

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* See note on p. 359.

The following list gives a short survey of the genera now known to belong to the Laophontidae:

Subfamily LAOPHONTINAE T. Scott, 1904, with the genera:
- *Laophonte* Philippi, 1840, type species *L. cornuta* Philippi, 1840
- *Loureirophonte* Jakobi, 1954, type species *L. catharinensis* Jakobi, 1954
- *Pseudonychocamptus* Lang, 1944, type species *Laophonte koreni* Boeck, 1872
- *Pilifera* Noodt, 1952, type species *Laophonte gracilis* T. Scott, 1903
- *Heterolaophonte* Lang, 1948, type species *Cyclops strömii* Baird, 1843
- *Paronychocamptus* Lang, 1948, type species *Laophonte curticaudata* Boeck, 1864
- *Paralaophonte* Lang, 1948, type species *Cleta brevirostris* Claus, 1863
- *Asellopsis* Brady and Robertson, 1873, type species *A. hispidus* Brady and Robertson, 1873
- *Platychelipus* Brady, 1880, type species *P. littoralis* Brady, 1880
- *Esola* Edwards, 1891, type species *E. longicauda* Edwards, 1891
- *Moerephonte* Jakobi, 1954, type species *M. catharinensis* Jakobi, 1954
- *Pseudolaophonte* A. Scott, 1896, type species *P. aculeata* A. Scott, 1896 (= *Laophonte spinosa* I. C. Thompson, 1893)
- *Onychocamptus* Daday, 1903, type species *O. heteropus* Daday, 1903 (= *Laophonte mohammed* Blanchard and Richard, 1891)
- *Klieonychocamptus* Noodt, 1958, type species *Laophonte kliei* Monard, 1935
- *Laophontina* Norman and T. Scott, type species *L. dubia* Norman and T. Scott, 1905
- *Klieonychocamptoides* Noodt, 1958, type species *K. remanei* Noodt, 1958
- *Afrolaophonte* Chappuis, 1960, type species *A. monodi* Chappuis, 1960
- *Harrietella* T. Scott, 1906, type species *Laophonte simulans* T. Scott, 1894
- *Hemilaophonte* Jakubisiak, 1932, type species *H. janinae* Jakubiasiak, 1932
- *Lobitella* Monard, 1934, type species *L. apoda* Monard, 1934
- *Sarsocletodes* C. B. Wilson, 1924, type species *Pseudocletodes typicus* G. O. Sars, 1920
- *Mictyricola* Nicholls, 1957, type species *M. typica* Nicholls, 1957

A new genus will be described below as:

Microlaophonte, new genus, type species *M. spongicola*, new species

The definition of the Laophontinae as given by Lang (1944, p. 31; 1948, p. 1342) must be amended slightly to include the genus *Mictyricola* Nicholls.

Subfamily NORMANELLINAE Lang, 1944, with the genera:
- *Cleta* Claus, 1863, type species *C. lamellifera* Claus, 1863
- *Pseudocleta* Lang, 1944, type species *Laophonte corbula* Willey, 1935
- *Normanella* Brady, 1880, type species *Laophonte dubia* Brady and Robertson, 1875
- *Cletopsyllus* Willey, 1935, type species *C. papillifer* Willey, 1935

A new genus will be described below as:

Pseudocletopsyllus, new genus, type species *P. spiniger*, new species

Subfamily DONSIELLINAE Lang, 1944, with the genus:
- *Donsiella* Stephensen, 1936, type species *D. limnoriae* Stephensen, 1936

For the following genus the systematic position is uncertain:

Laophontella Thompson and A. Scott, 1903, type species *L. typica* Thompson and A. Scott, 1903

A new genus, of which the systematic position and even its place in the Laophontidae is doubtful, will be described below as:

Pholenota, new genus, type species *P. spatulifera,* new species

Subfamily Laophontinae T. Scott, 1904

Genus *Laophonte* Philippi, 1840

This genus now contains the following species:

Females	Males
"cornuta" group	
Laophonte cornuta Philippi, 1840	*L. cornuta* Philippi, 1840
(=*Harpacticus fortificationis* Fischer, 1860; *Cleta forcipata* Claus, 1866)	
L. c. var. *dentioperculata* Lang, 1936	*L. c.* var. *dentioperculata* Lang, 1936
L. c. var. *nigrocincta* Nicholls, 1944a	*L. c.* var. *nigrocincta* Nicholls, 1944a
L. adduensis Sewell, 1940	*L. adduensis* Sewell, 1940
"serrata" group	
Cleta serrata Claus, 1863	*C. serrata* Claus, 1863
(=*L. propinqua* T. and A. Scott, 1895)	
L. dominicalis Monard, 1935	
"depressa" group	
L. depressa T. Scott, 1894	*L. depressa* T. Scott, 1894
L. applanata G. O. Sars, 1909	*L. applanata* G. O. Sars, 1909
"setosa" group	
L. setosa Boeck, 1864	*L. setosa* Boeck, 1864
(=*Laophonte affinis* Boeck, 1872; *L. similis* auct. not Claus)	
L. thoracica Boeck, 1864	*L. thoracica* Boeck, 1864
(=*Tetragoniceps longiremis* Brady and Robertson, 1875)	
L. longicaudata Boeck, 1864	*L. longicaudata* Boeck, 1864
(=*L. Hodgii* Brady, 1872)	
L. l. var. *reducta* Lang, 1936	*L. l.* var. *reducta* Lang, 1936
L. elongata Boeck, 1872	*L. elongata* Boeck, 1872
L. e. var. *triarticulata* Monard, 1928	
L. barbata Lang, 1934	
"inornata" group	
L. inornata A. Scott, 1902	*L. inornata* A. Scott, 1902
(=*L. sporadiensis* Brian, 1928)	
L. dinocerata Monard, 1926	
L. parvula G. O. Sars, 1908	
L. sima Gurney, 1927	
L. parvuloides Monard, 1935	
"denticornis" group	
L. denticornis T. Scott, 1894	*L. denticornis* T. Scott, 1894
L. nordgaardi G. O. Sars, 1908	*L. nordgaardi* G. O. Sars, 1908
L. brevifurca G. O. Sars, 1920	

L. baltica Klie, 1929	*L. baltica* Klie, 1929
L. recticauda Willey, 1935	
L. arenicola Nicholls, 1939	
L. adriatica Petkovski, 1955	*L. adriatica* Petkovski, 1955
L. ifalukensis, new species	*L. ifalukensis*, new species
L. i. var. *brevipes*, new variety	
"inopinata" group	
L. inopinata T. Scott, 1892	
L. longistylata Willey, 1935	*L. longistylata* Willey, 1935

The following species belong in the genus *Laophonte* but, on account of imperfect knowledge, cannot be placed in any of the above mentioned groups:

Laophonte farrani Roe, 1958	*L. farrani* Roe, 1958
(probably "denticornis" group)	
L. foxi Harding, 1956	*L. foxi* Harding, 1956
(probably "inornata" group)	
L. platychelipusoides Noodt, 1958	

Specimens of *L. cornuta*, *L. dinocerata*, and of the new species *L. ifalukensis* occur in the Ifaluk collection.

***Laophonte cornuta* Philippi, 1840**

Laophonte cornuta Philippi, 1840, p. 195, pl. 3 (fig. 13).—Vàtova, 1928, p. 183.—Marine Biological Association, 1931, p. 165.—Fraser, 1936, p. 26.—Sewell, 1940, pp. 313, 314, 352, 359, 361, 363, 365, 366, 367, 369, 371, 373–376.—Nicholls, 1941, p. 422.—Lang, 1944, p. 32.—Nicholls, 1945, p. 7.—Lang, 1948, p. 1347, figs. 543 (no. 1), 544 (no. 1).—Carvalho, 1952, p. 160, pl. 2 (figs. 72–75).—Harding, 1956, p. 669.—Maghraby and Perkins, 1956, p. 492.—Marine Biological Association, 1957, p. 169.—Roe, 1958, p. 232.—Wieser, 1959, pp. 107, 110.—Roe, 1960, p. 286.

Material.—Loc. 431, 6 ad. ♀♀, 0.57–0.62 mm. (0.60 mm.); 2 ad. ♂♂, 0.56, 0.57 mm. Loc. 588, 1 ad. ♀, 0.69 mm.; 1 ad. ♂, 0.65 mm. Loc. 589, 2 ov. ♀♀, 0.57 and 0.63 mm.; 3 ad ♀♀, 0.57–0.63 mm.; 3 ad. ♀♀, 0.57–0.63 mm. (0.61 mm.); 4 ad. ♂♂, 0.48–0.57 mm. (0.52 mm.). Loc. 590, 1 ad. ♂, 0.60 mm. Loc. 638, 1 ad. ♀, 0.53 mm.

Remarks.—The Ifaluk specimens agree with the typical form of this well-known and widely distributed species. It has not been described in detail here. The geographical distribution has been summarized by Sewell (1940, p. 314) and discussed at some length by Lang (1948, p. 1348). The following additional records may be mentioned here: the Dalkey area of County Dublin and Lough Ine of County Cork, Ireland (Roe, 1958, 1960); the Plymouth area of England (Marine Biological Association, 1931, 1958; Fraser, 1936); the Whitstable area of County Kent, England (Maghraby and Perkins, 1956); the Bay of Santos in Brazil (Carvalho, 1952); the Rovinj, Yugoslavia, area in the Adriatic (Vàtova, 1928); Addu Atoll in the

Maldive Archipelago (Sewell, 1940); Spencer Gulf and Sellick Beach in South Australia (Nicholls, 1941); Port Denison in Western Australia (Nicholls, 1945); and Puget Sound in the United States (Wieser, 1959). The occurrence of this species at Ifaluk fits admirably in the general pattern of its distribution over the tropical and temperate regions of the Pacific, Indian, and Atlantic Oceans. In the Ifaluk collections it predominates in sand samples taken at various intervals from the reef margin, but it also occurs in a washing of caulerpas and in crevices near the reef margin. The specimens, generally, are slightly smaller than those recorded by Sewell (♀ 0.80 mm.) and Nicholls (♀ 0.90–1.02 mm., ♂ 0.90 mm.).

***Laophonte dinocerata* Monard, 1926**

FIGURES 125, 126

Laophonte dinocerata Monard, 1926a, p. 619, figs. 1–10.—Monard, 1928, p. 420, fig. 41 (no. 2).—van Douwe, 1929, p. 285.—Monard, 1935, p. 60; 1935a, p. 69; 1937, p. 70.

Laophonte inornata Lang, 1948, p. 1355, fig. 546 (in part).

MATERIAL.—Loc. 709, 1 ad. ♀, 0.47 mm.

DESCRIPTION.—The following is based on the above-mentioned specimen, which has been dissected and mounted.

Adult female, total length 0.47 mm.; greatest diameter 0.14 mm.; length of longest furcal seta 0.30 mm.

General shape of body elongate, slightly compressed dorso-ventrally, with greatest diameter at end of cephalothorax and very gradually narrowing posteriorly, at genital somite distinctly widened (fig. 125*a*). Head and 1st thoracic somite fused to form cephalic somite, which is as long as combined lengths of thoracic somites 2 and 4. Frontal part of cephalic somite narrowing, rostrum broad, triangular structure with very broad base and rounded apex, incised on both sides and provided there with small hair. Back in lateral aspect almost straight, rostrum pointing forward and very slightly downward (fig. 125*b*). 2nd to 5th thoracic somites of nearly same length, at distal end of dorsal wall set with fine spinules. Epimeral plates of these somites scarcely produced, insertion of legs distinctly visible laterally. 3rd to 5th thoracic somites dorsolaterally produced into backwardly directed, chitinized spiniform processes, distinctly visible in lateral and dorsal view. The exact size of these processes can best be judged from figures 125*a,b*; they give the cephalothorax a very characteristic appearance. Total length of cephalothorax 1½ times length of abdomen.

Genital somite composed of fused abdominal somites 1 and 2; line of fusion distinctly visible dorsally and bordered with fine spinules. 1st abdominal somite slightly and 2nd abdominal somite distinctly laterally produced; wing-shaped part of 2nd abdominal somite set

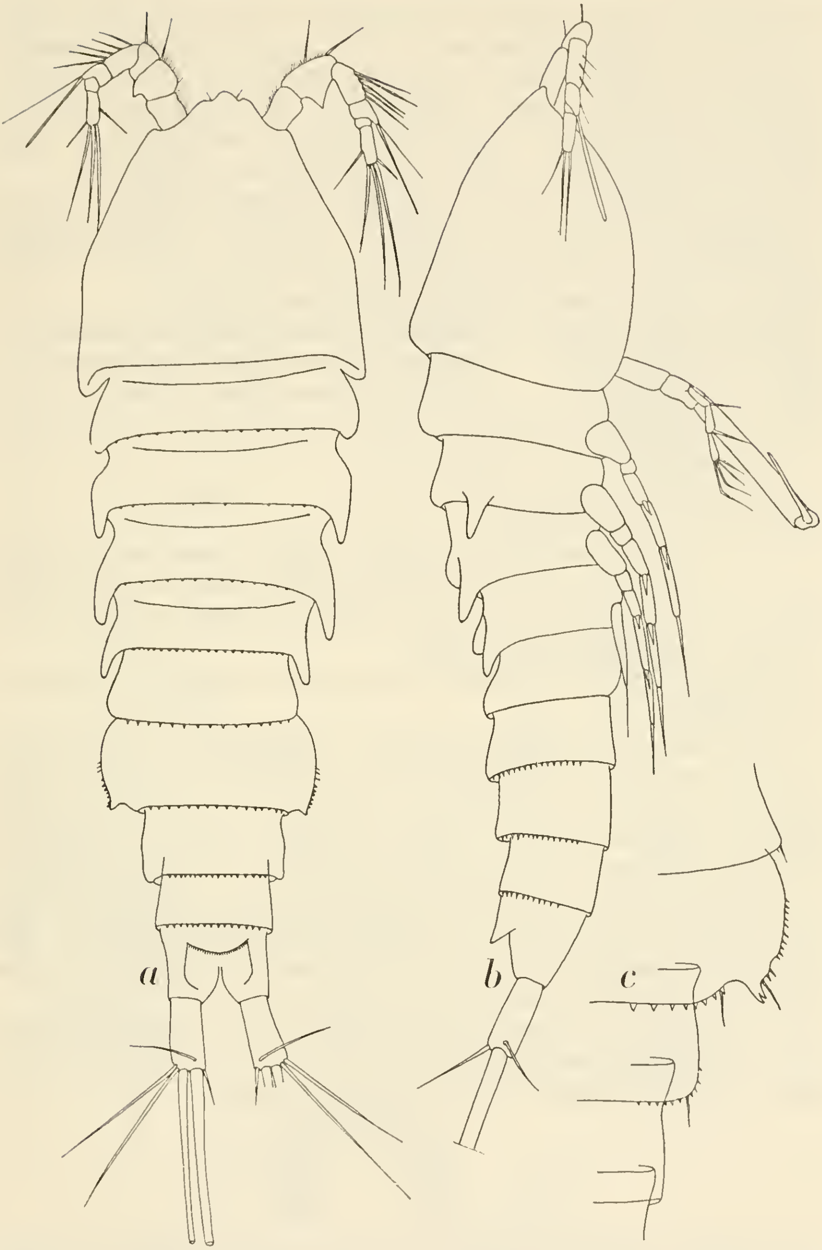

FIGURE 125.—*Laophonte dinocerata* Monard, loc. 709, ad. ♀: *a*, whole animal, dorsal view; *b*, same animal, lateral view from right side; *c*, proximal part of abdomen, right side, dorsal view. (*a*, *b*, × 275; *c*, × 460.)

with spinules along margin and terminates in bifid point (fig. 125*c*). 3rd abdominal somite as long as 1st or 2nd (which have same length), 4th thoracic somite shorter. Anal somite as long as wide, slightly narrowing, with big, broad genital flap and deeply cleft between insertion of furcal rami. Anal plate fringed with spinules; dorsal part of distal margin of somites 2 to 4 set with small spinules.

Furcal rami 2½ times as long as wide, cylindrical, each ramus with 5 marginal setae and 1 appendicular seta. Setae 1, 4, 5, and appendicular seta fine and fairly short; setae 2 and 3 lengthened and thickened, especially 2nd, which reaches ⅔ length of body.

Antennules 6-segmented, ultimate segment large, apparently resulting from fusion of some smaller segments. 2nd segment with big, outwardly directed, strong tooth with broad base. Setation represented in figure 126*f*; small 4th segment with short conical process bearing aesthetasc and 2 setae.

Antenna with allobasis and distinct, unsegmented exopodite, bearing 4 strong setae (fig. 126*g*).

Cutting edge of mandibular praecoxa with 5 foliaceous teeth and fine seta; palp is composed of single, styliform segment, apparently representing fused basis and coxa, bearing 4 setae; no trace of an exopodite or endopodite (fig. 126*h*).

I failed to obtain a satisfactory dissection of maxillule, maxilla, and maxillipede.

Leg 1 (fig. 126*a*) with 3-segmented exopodite and endopodite. Coxa with external and internal fringe of long, acute spinules. Basis with single external spine, placed halfway along haired external margin. Exopodal segments of equal length, 2nd without internal seta, 3rd with total of 4 appendages, 2 of which are geniculate setae. 1st endopodal segment styliform, longer than whole exopodite, 8 times as long as wide, internal margin with long, slender spines. 2nd endopodal segment small, slender, coalescent with hooked 3rd endopodal segment, with fine seta near place of fusion.

Legs 2 to 4 with 3-segmented exopodites and 2-segmented endopodites. Basis with strongly haired external seta. The various details appear clearly in figures 126*b*–*d*; the setal formula is:

	endopodite	*exopodite*
leg 2	0.220	0.1.123
leg 3	0.321	0.1.223
leg 4	0.221	0.1.223

Leg 5 (fig. 126*e*) with broad baso-endopodite, reaching ⅔ length of exopodite, internal margin strongly spinulose, bearing total of 5 setae, 2 of which are found at apex. Exopodite ovate, twice as long as broad, with 5 setae and at internal margin 3 slender spinules, which might easily pass as small setae.

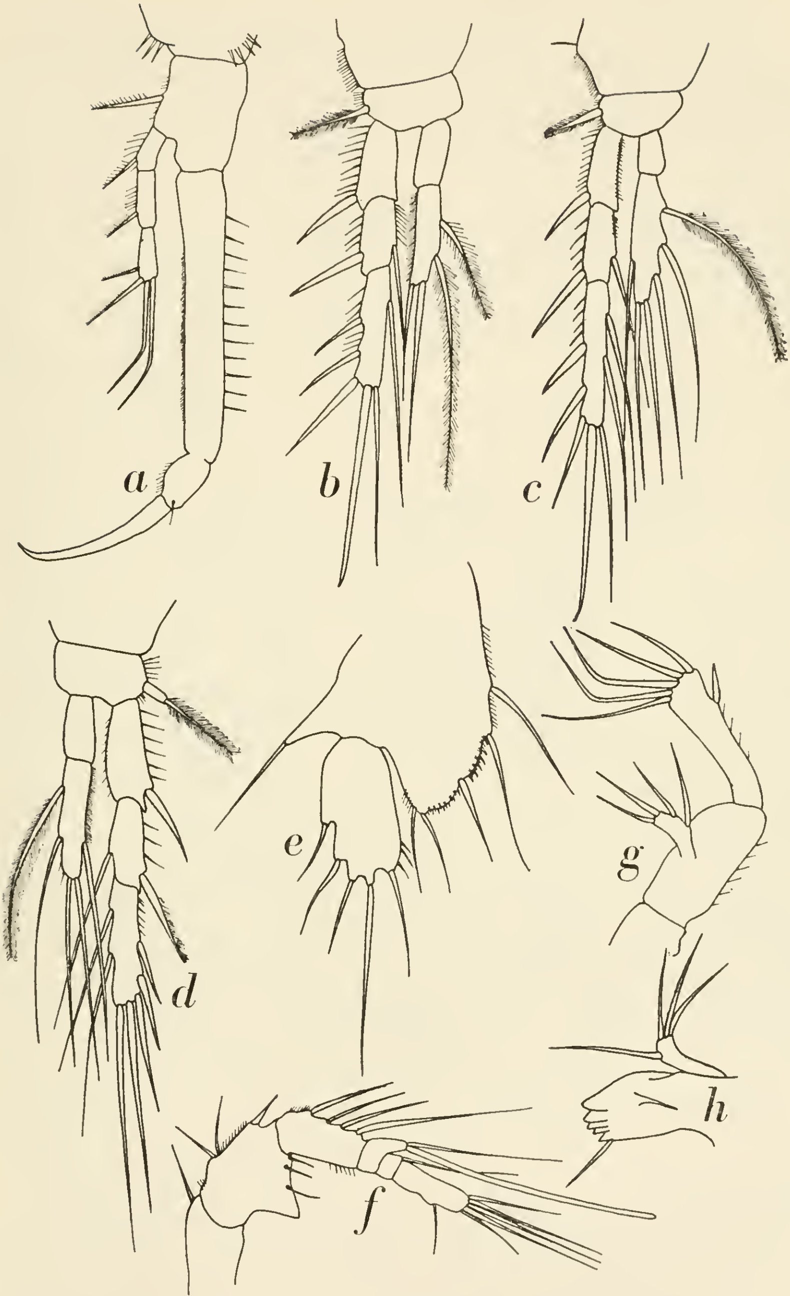

Figure 126.—*Laophonte dinocerata* Monard, loc. 709, ad. ♀: *a*, leg 1; *b*, leg 2; *c*, leg 3; d, leg 4; *e*, leg 5; *f*, antennule; *g*, antenna; *h*, mandible. (× 460.)

Color faded, transparently whitish; no eye or pigmented spot.

REMARKS.—The present species has all the characters of the "inornata" group of *Laophonte* except for the 6-segmented antennule, which in that group is usually 7-segmented. I have, in the description, drawn attention to the very long ultimate segment; it seems probable that the structure of the antennule in this only female specimen is slightly aberrant. Certainly it is identical with *L. dinocerata* Monard, 1926, placed by Lang in the "inornata" group, but synonymized by that author with *L. inornata* A. Scott, 1902. On this point, in my opinion, Lang is certainly mistaken; both species undoubtedly are related closely, as the identical setal formulae indicate, but they stand apart in the structure of the thoracic somites. Monard figures his specimen in the lateral aspect only, but the dorsolateral spiniform expansions of the 3rd to 5th thoracic somites are very evident from his drawing in figure 1; these expansions also appear in figure 2, representing a transversal section through the 4th thoracic somite and apparently resulting from the isolation of the thoracic rings. The fact that all of Monard's female specimens were strongly curved—a fact mentioned in his diagnosis but scarcely of taxonomic importance here—apparently prevented him from making a drawing of the animal or the genital region in dorsal view, with the result that the curious structure of the genital somite escaped his attention. The structure of leg 5, as appears from Monard's figure 10, parallels the condition in the present specimen to the minutest detail; even the closely packed spinules along the baso-endopodite are visible in Monard's figure; the antennular structure, with the exception of the ultimate and penultimate segments, is nearly identical.

The distinct dorsolateral prolongations, according to Lang, should represent the epimeral plates drawn out dorsally into chitinized knobs ("Chitinzapfen"), which may be the case in *L. sporadiensis* (according to Lang, synonymous with *L. inornata*) but certainly does not cover the condition found in *L. dinocerata*, where the distinct projections are free of the epimeral plates. Lang's reference to errors in observations and differences in interpretation—"Die Diskrepanzen . . . beruhen ganz einfach auf mangelhaften Beobachtungen und verschiedener Deutung der Objekten" (1948, p. 1345)—in this particular instance seems too simple and gives no credit to Monard's work, which does not deserve such denigrating comment.

The species is known from three Mediterranean localities: Banyuls-sur-Mer, France (Monard, 1926, 1928); Bab-el-Oued, Algeria, (Monard, 1937); Salammbô, Tunisia, (Monard, 1935); and from an English Channel locality: Roscoff, France (Monard, 1935). The presen specimen, the first from the Pacific, was washed from sponges collected from the reef at Elangelap in the Ifaluk Atoll.

Laophonte ifalukensis, new species

FIGURES 127, 128*c*, 129, 130

MATERIAL.—Loc. 589, 1 ad. ♀, 0.42 mm. Loc. 591, 5 ad. ♀, 0.39–0.45 mm. (0.43 mm.). Loc. 592, 1 ov. ♀, 0.48 mm.; 1 ad. ♂, 0.36 mm. Loc. 638, 3 ov. ♀♀, 0.42–0.45 mm. (0.44 mm.); 2 ad. ♂♂, 0.43 and 0.45 mm.

DESCRIPTION.—The following is based on the female specimen from locality 589 (holotype). Since this holotype fragmented during handling, some drawings of the undissected female have been made from the ovigerous female paratype specimen from locality 592. The male allotype is from locality 592; all other specimens have been labelled as paratypes.

Adult female, total length 0.42 mm.; length of longest furcal seta 0.26 mm.

General shape of body elongate in dorsal aspect, with greatest diameter at end of cephalic somite, distinctly dilated at genital somite. Head and 1st thoracic somite fused to form cephalic somite, which is as long as combined lengths of thoracic somites 2 to 5. Back, in lateral aspect, almost straight and running into short, slightly curved rostrum (fig. 127*a*). Sides of cephalic somite moderately produced to cover basal parts of oral appendages; lateroventral border considerably produced backwardly. Rostrum broad triangular plate, rounded at apex, which has two minor incisions, each with hair of frontal organ. Rostrum directed forward and slightly downward, not separated from head. Thoracic somites 2 to 4 of nearly equal length, with distinctly visible, rounded epimeral plates bordered with spinules. 5th thoracic somite slightly longer than preceding somite.

Genital somite composed of fused abdominal somites 1 and 2, line of fusion visible dorsally and invisible ventrally. 3rd abdominal somite slightly longer than 2nd, as 2nd with laterally expanded wings, exact shape of which can best be judged from figure 128*c*. Wing (epimeral plates) visible both dorsally and ventrally. 4th abdominal and anal somite of equal length; 4th normally developed. All thoracic and abdominal somites, including cephalic somite, distally bordered with fine spinules along dorsal and dorsolateral walls. Anal somite has broad anal plate, also bordered with spinules, insertion of furcal rami also fringed with spinules.

Furcal rami twice as long as broad, very slightly diverging, external border almost straight, internal border slightly convex and spinulose. Each ramus with 5 marginal setae and 1 appendicular seta (fig. 127*b*). Setae, 1, 4, 5, and appendicular seta fine and short; setae 2 and 3 lengthened and thickened, especially the 2nd; both not swollen at base. Setae 4 and 5 placed close together at distal part of external border.

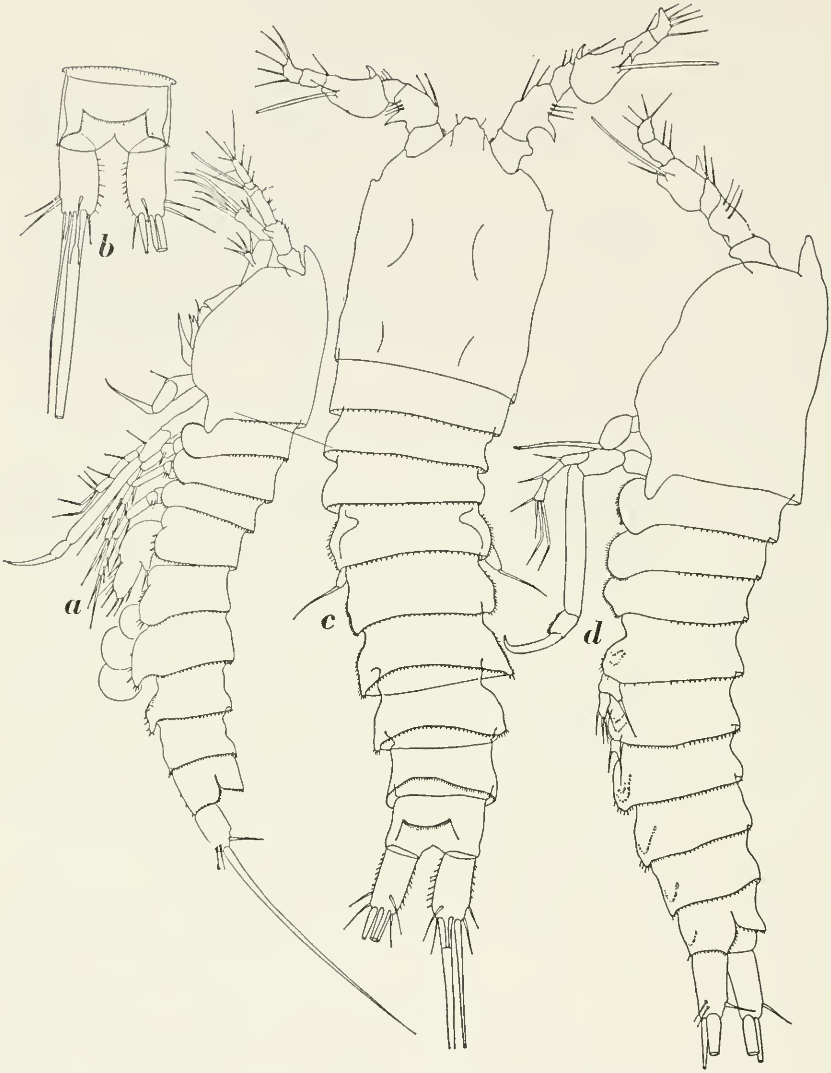

Figure 127.—*Laophonte ifalukensis*, new species, loc. 592, ad. ♀, paratype: *a*, whole animal, lateral view from left side; *b*, anal somite and furca, dorsal view; ad. ♂, allotype: *c*, whole animal, dorsal view; *d*, same animal, lateral view from left side. (*a*, × 165; *b–d*, × 275.)

Antennules (figs. 129*f*, 130*a*) 6-segmented: segment 1 with upwardly directed, rounded knob; segment 2 with externally directed, curved, pointed spine halfway along external border (of both spines, usually only one is visible since they are placed in a different plane); segment 3 fairly long; segment 4 short, with small conical process bearing aesthetasc and 2 setae.

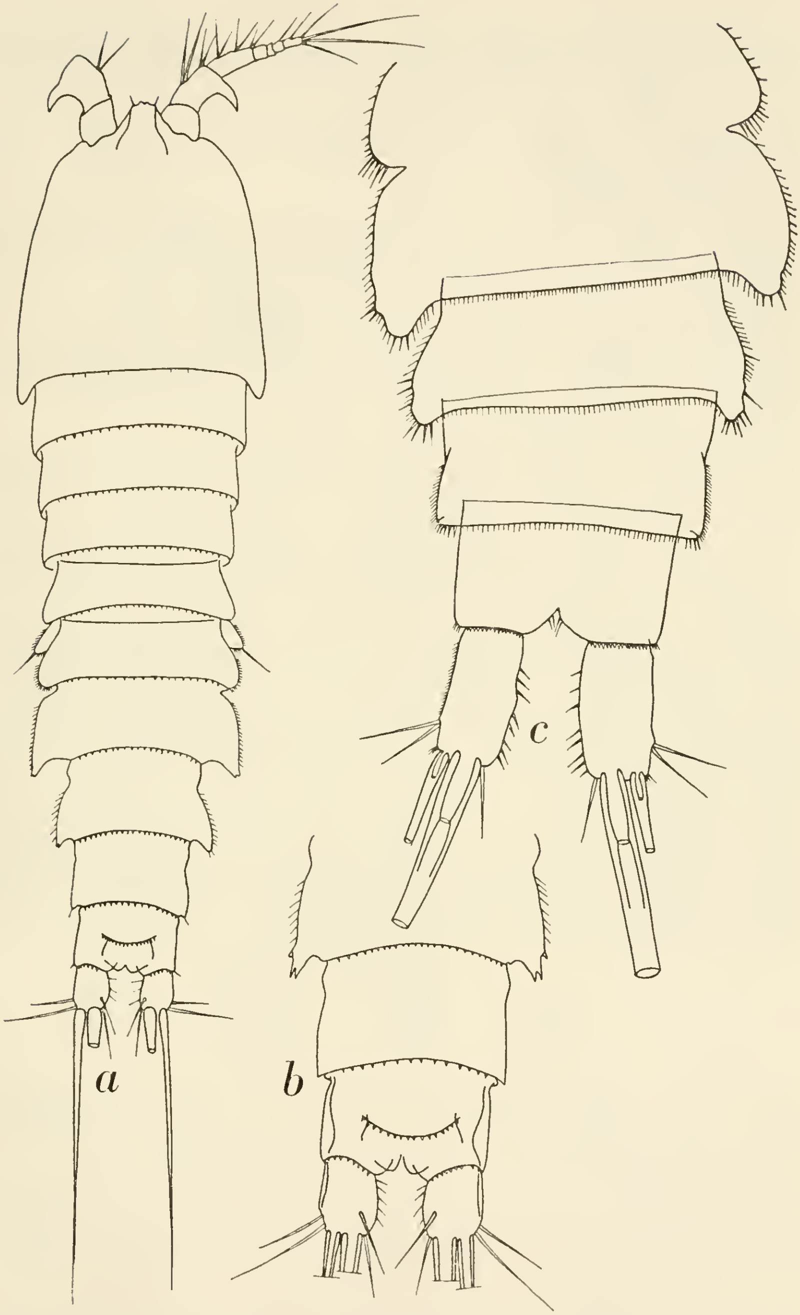

FIGURE 128.—*Laophonte ifalukensis* var. *brevipes*, new var., loc. 592, ad. ♀, holotype: *a*, whole animal, dorsal view; *b*, distal part abdomen and furca, dorsal view. *Laophonte ifalukensis*, new species, loc. 589, ad. ♀, holotype: *c*, abdomen, ventral view. (*a*, × 315; *b*, *c*, × 520.)

Antenna (fig. 130*b*) with allobasis and unsegmented, short exopodite, bearing 4 setae. Endopodite with 5 marginal and 2 internal spiniform setae; 4 marginal setae are geniculate. Internal border spinulose.

Cutting edge of mandibular praecoxa (fig. 130*c*) with 6 teeth and 1 seta; palp much reduced, represented by styliform process, 2-segmented, bearing 2 setae.

Maxillule (fig. 130*d*) with well-developed praecoxal arthrite, bearing 7 spiniform setae. Endites of coxa and basis distinct, conical, each with 2 setae. Endopodite greatly reduced, bearing 3 setae. Exopodite small, conical, bearing 4 setae. No epipodite.

Maxilla (fig. 129*g*) with 2 small praecoxal endites and 1 coxal endite, each with 3 setae. Basal endite large, with strong, curved spine, coalescent with endite. In addition, there are 4 setae near the insertion of the spine, probably representing the endopodite.

Maxillipede (fig. 129*h*) chelate, of usual type. Basis with slightly swollen external margin and straight internal margin; endopodite unsegmented, slender, slightly curved, exceeding basis in length.

Leg 1 (fig. 129*a*) with 3-segmented endopodite and exopodite. Coxa big, with spinulose internal and external margin. Basis with external seta; endopodite placed on distinct socle, bearing short spine. Exopodal segments of equal length, 2nd without internal seta; 3rd with 4 appendages. 1st endopodal segment styliform, 6 times as long as wide, twice length of exopodite, internal margin spinulose. Segments 2 and 3 more or less fused, forming pointed claw, of which apex is slightly curved. Fine seta occurs on segment 2 near fusion with 3rd segment.

The particulars of legs 2 to 4 appear from the setal formula, figures 129*c–d*, and the following notes. Setation of endopodite of leg 2 slightly variable, being 4 setae in the holotype and 3 in the other female (paratype) specimen. Setal formula:

	endopodite	*exopodite*
leg 2	0.1–220	0.1.123
leg 3	0.220	0.1.223
leg 4	0.120	0.1.223

Legs 2 to 4 with 3-segmented exopodites and 2-segmented endopodites. Basis with long external seta. Seta at internal margin of 2nd exopodal segment fine. Endopodite of leg 4 very small.

Leg 5 (fig. 129*e*) with well-developed, broad baso-endopodite, reaching upper third of exopodite. Margin of baso-endopodite strongly spinulose and carries 4 setae. Exopodite ovate, twice as long as broad, attached with very narrow strip, with 5 marginal setae along spinulose border: 3 at external border, 1 at apex, and 1 at internal border. Development of the setae can best be judged from figures 129*e*,*i*.

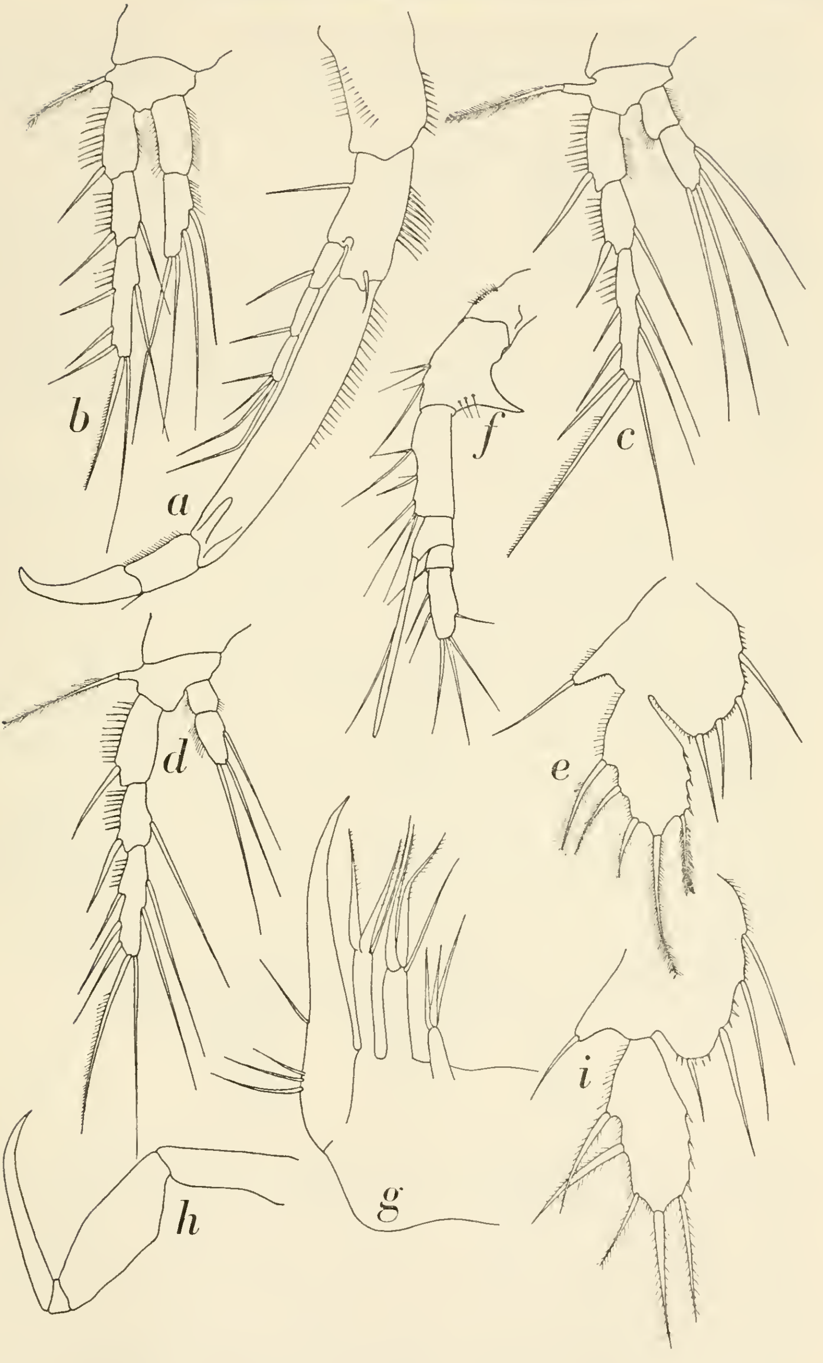

Figure 129.—*Laophonte ifalukensis*, new species, loc. 589, ad. ♀, holotype: *a*, leg 1; *b*, leg 2; *c*, leg 3; *d*, leg 4; *e*, leg 5; *f*, antennule; *g*, maxilla; *h*, maxillipede; loc. 592, ad. ♀, paratype: *i*, leg 5. (*a–f*, *h*, *i*, × 520; *g*, × 1000.)

Color completely faded, transparently yellowish. No trace of eye or pigmented spot. The ovigerous females carry a sac containing 3 to 5 small eggs.

Adult male, total length 0.36 mm.; greatest diameter 0.08 mm.; length of longest furcal seta 0.20 mm.

General shape of male as in female, both in dorsal and lateral aspects. Cephalic somite slightly longer, and in dorsal view shows pair of small hooks, one on each side, inferior of insertion of antennules (fig. 127*c*). In addition, there is a pair of integumental depressions, one on each side of the middorsal line, in the middle of the cephalic somite. Back, in lateral aspect, concave; length of thoracic and abdominal somites, development of epimeral plates, and spinulation exactly as in female (fig. 127*d*). Furcal rami twice as long as broad, setation as in female.

The whole carapace has a pitted structure, the pits apparently serving as an insertion for the very short hairs covering the whole body. The whole pattern is best developed on the cephalic somite.

Antennules of moderate length, ⅔ length of cephalic somite, 6-segmented, subchirocerate. Segment 1 with apical, upwardly directed knob, segment 2 with strong, curved, externally directed spine. Segment 4 swollen, with conical process, bearing aesthetasc and 2 setae. Base of this segment bears short tooth, forming part of closing mechanism. Hinge developed between segments 4 and 5; segments 5 and 6 small. Setation represented in figure 130*e*.

Antenna and mouth parts identical with those of female.

Because of the bad condition of this specimen, I made drawings and took the setal formula from the undissected appendages; the animal fragmented during dissection, but I was able to reconstruct the legs.

Leg 1 (fig. 130*f*) as in female, with external spine of basis smaller. Legs 2 to 4 (figs. 130*g–i*) with the following setal formula:

	endopodite	*exopodite*
leg 2	0.120	0.1.123
leg 3	modified	0.1.223
leg 4	0.120	0.1.223

Leg 2 with strong setae on endopodite. Endopodite of leg 3, 3-segmented: segment 1 and 2 of equal length, 2nd apparently carrying a process which was removed during dissection; 3rd with 4 setae.

Leg 5 (fig. 130*j*) with very small exopodite, distinctly articulating with baso-endopodite, 1½ times as long as wide, with 5 setae. Baso-endopodite scarcely elevated, with single, medially placed seta. External lobe well developed, with single seta.

Armature of genital plates composed of 2 setae on each side.

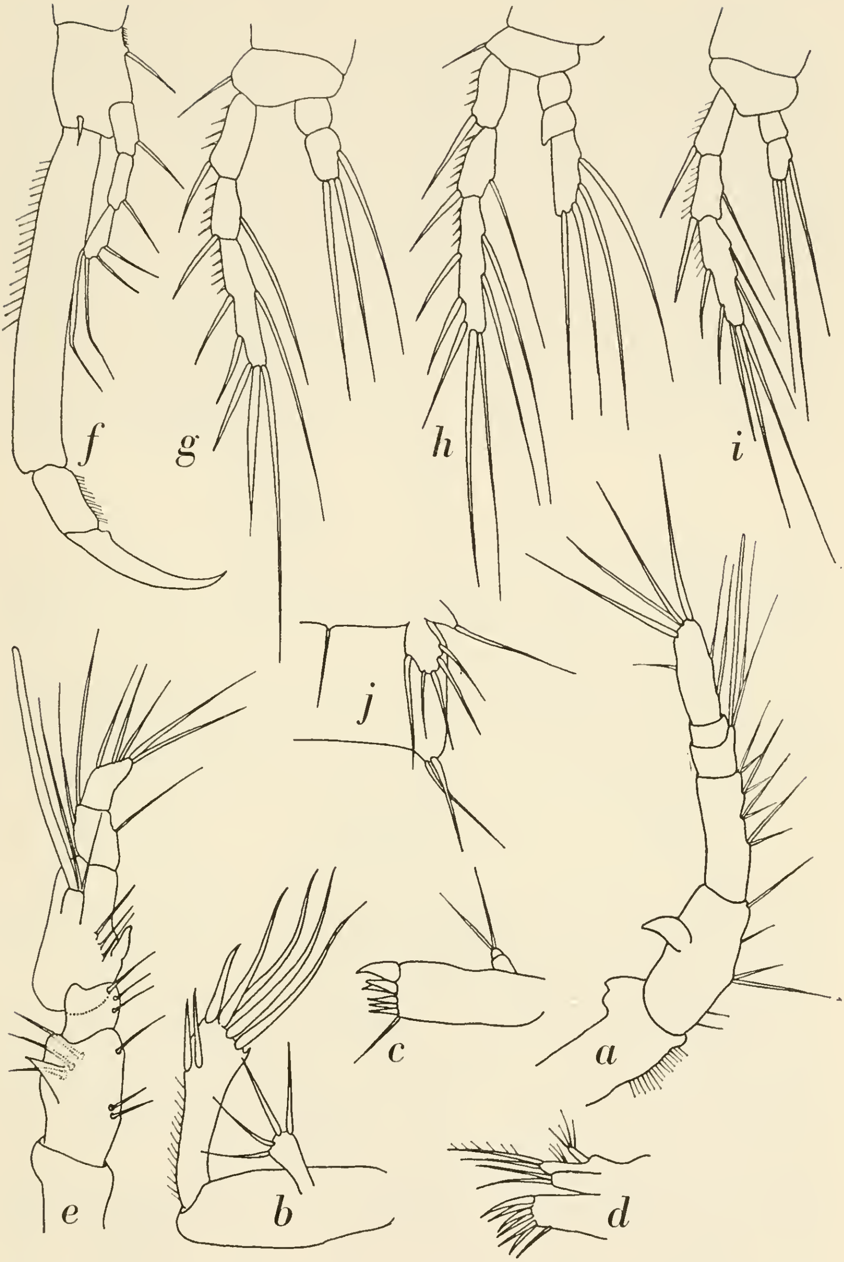

FIGURE 130.—*Laophonte ifalukensis*, new species, loc. 589, ad. ♀, holotype: *a*, antennule; *b*, antenna; *c*, mandible; *d*, maxillule; loc. 592, ad. ♂, allotype: *e*, antennule; *f*, leg 1; g, leg 2; *h*, leg 3; *i*, leg 4; *j*, legs 5 and 6. (× 520.)

Remarks.—The present new species clearly belongs in the "denticornis" group of the genus *Laophonte*. Neither in the shape of leg 5 nor in the setation has it agreed with any of the species attributed to this group until now, nor with any of the other species on which I could check the description. In the general shape of the body it approaches *L. denticornis* T. Scott in many points although the development of the epimeral plates is slightly different in both species and the furcal rami of *L. denticornis* are much longer. The setation of the 2nd endopodal segment of leg 2 appears to be slightly variable, 4 setae being found in the type and 3 in the paratypes. I believe 3 to be the normal number, as it occurs in both the females and the male; the holotype, unfortunately, is slightly aberrant in this respect. Of the two apical setae on the endopodite, one might in fact be an external seta, with the result that the setal formula might be written:

	endopodite	*exopodite*
leg 2	0.111	0.1.123
leg 3	0.121	0.1.223
leg 4	0.111	0.1.223

The setal formula gives the species a more or less isolated position in the genus *Laophonte* although approaching the type normally met with in the "denticornis" group.

The species occurs in sand samples taken at various distances from the reef border at Falarik and in crevices along the reef margin on that island. The trivial name *ifalukensis* has been chosen to record the fairly common occurrence of this new species at Ifaluk Atoll.

Laophonte ifalukensis var. *brevipes*, new variety

Figures 128*a*,*b*, 131*a*–*e*

Material.—Loc. 592, 2 ad. ♀♀, 0.35 and 0.36 mm.

Description.—The biggest specimen (0.36 mm.) has been dissected and mounted, representing the holotype of this variety.

Adult female, total length 0.36 mm.; greatest diameter 0.09 mm.

Among all female specimens of *Laophonte ifalukensis* there are 2 that are slightly smaller and, although exhibiting the same characteristic bodily structure, they already show a differently shaped 5th leg even without dissection. After dissection, some additional differences were found; all are recorded in the following:

1. Body exactly as in typical species, but smaller, with scarcely visible pitted structure (fig. 128*a*). Furcal rami, however, shorter, being only 1⅓ times as long as wide (fig. 128*b*). Setal development as in typical species.

2. Leg 1 (figs. 131*a*) smaller, but shaped exactly as in typical species. Legs 2 to 4 (figs. 131*b*–*d*) with setal formula of typical species (2nd endopodal segment of leg 2 with 3 setae), but endopodal segments

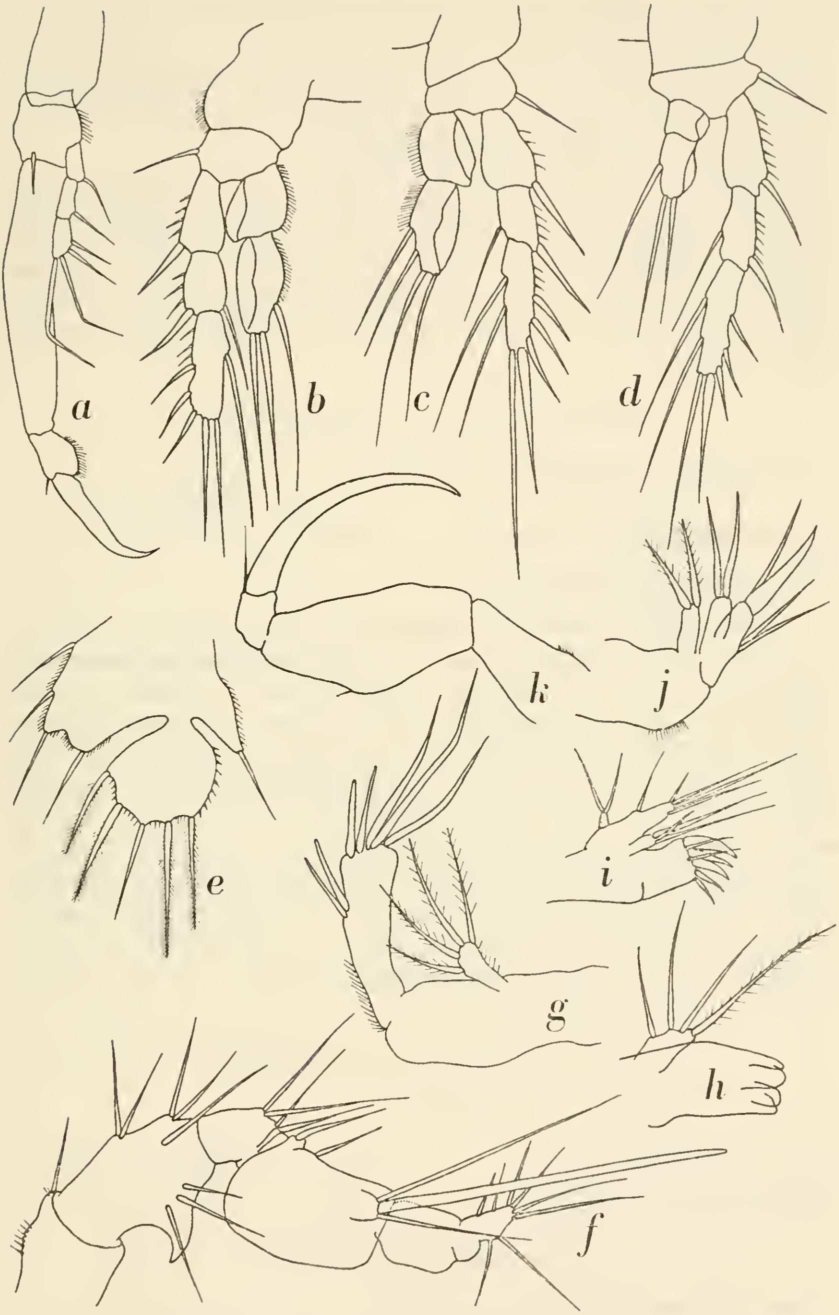

FIGURE 131.—*Laophonte ifalukensis* var. *brevipes*, new var., loc. 592, ad. ♀, holotype: *a*, leg 1; *b*, leg 2; *c*, leg 3; *d*, leg 4; *e*, leg 5. *Paralaophonte pilosoma*, new species, loc. 638, ad. ♂, holotype: *f*, antennule; *g*, antenna; *h*, mandible; *i*, maxillule; *j*, maxilla; *k*, maxillipede. (× 625.)

have distinct external hyaline lamella, which gives endopodites a more flattened appearance.

3. Leg 5 (fig. 131*e*) with short, oblong-ovate or rounded exopodite, exactly as long as wide, with 5 marginal setae and spinulose border. Baso-endopodite as in the typical species.

REMARKS.—The two specimens recorded here have so many characters in common with *L. ifalukensis* that I feel obliged to consider them as a variety of that species. The antennular structure, with the knob on segment 1 and the hook on segment 2, is also as it appears in the typical species. The specimens occurred, together with examples of the typical species, in a sand sample taken some 340 feet from the reef margin at Falarik in the Ifaluk Atoll.

Genus *Loureirophonte* Jakobi, 1954

The following two species are known:

FEMALES	MALES
Loureirophonte catharinensis Jakobi, 1954	*L. catharinensis* Jakobi, 1954
L. paranaënsis Jakobi, 1954	

I am inclined to regard this genus with extreme doubt. First of all, I think there is every reason to doubt the setal formulae which Jakobi gives for the two species. A comparison of the setal formulae with the figures shows that some spinules along the external border of the endopodite, particularly in the endopodite of leg 2, have been counted as setae, while there are no internal setae on the 2nd exopodal segment of legs 2 to 4—a condition which is found only in the "inornata" group of *Laophonte* and in *Klieonychocamptus*. Both species mentioned above probably are referrable to the "inornata" group of *Laophonte*. Should it become advisable to give that group a generic standard, the name *Loureirophonte* could be used, provided the generic diagnosis can be checked and amplified with the use of Jakobi's specimens.

Genus *Pseudonychocamptus* Lang, 1944

The following species are known:

FEMALES	MALES
Laophonte koreni Boeck, 1872	*L. koreni* Boeck, 1872
L. proxima G. O. Sars, 1908	*L. proxima* G. O. Sars, 1908
L. abbreviata G. O. Sars, 1920	

Genus *Pilifera* Noodt, 1952

The only species known:

FEMALES	MALES
Laophonte gracilis T. Scott, 1903	*L. gracilis* T. Scott, 1903

This species was separated from *Pseudonychocamptus* by Noodt (1952, p. 13) and placed in a separate genus because of the great sexual dimorphism demonstrated, especially in the legs. The female in *Pilifera* cannot be distinguished from that in *Pseudonychocamptus*.

Genus *Heterolaophonte* Lang, 1948

This genus was introduced by Lang in 1944 (p. 34) but no type was indicated; in 1948 it was validated by the indication of *Cyclops strömii* Baird as its type. The large genus is divided into many groups that are fairly heterogeneous and probably have subgeneric or even generic value.

FEMALES	MALES
"strömii" group	
Cyclops strömii Baird, 1934	*C. strömii* Baird, 1834
(=*Laophonte bafanus* Labbé, 1927)	
L. strömii brevicaudata Monard, 1928	*L. s. brevicaudata* Monard, 1928
Heterolaophonte strömii paraminuta Noodt, 1955	*L. s. paraminuta* Noodt, 1955
L. uncinata Czerniavski, 1868	*L. uncinata* Czerniavski, 1868
(=*L. pilosa* Car, 1884)	
L. manifera C. B. Wilson 1932	*L. manifera* C. B. Wilson, 1932
L. manifera sulamericana Jakobi, 1954	*L. m. sulamericana* Jakobi, 1954
L. phycobates Monard, 1935	
"minuta" group	
L. minuta Boeck, 1872	*L. minuta* Boeck, 1872
(=*L. subsala* Brady, 1902)	
H. hamatus Jakobi, 1954	
"littoralis" group	
L. littoralis T. and A. Scott, 1893	*L. littoralis* T. and A. Scott, 1893
H. littoralis longisetigera Klie, 1950	*H. l. longisetigera* Klie, 1950
L. curvata van Douwe, 1929	*L. curvata* van Douwe, 1929
L. mendax Klie, 1939	*L. mendax* Klie, 1939
"quinquespinosa" group	
L. quinquespinosa Sewell 1924	*L. quinquespinosa* Sewell, 1924
L. sigmoides Willey, 1930	*L. sigmoides* Willey, 1930
L. brevicornis T. Scott, 1894	
"discophora" group	
L. discophora Willey, 1929	*L. discophora* Willey, 1929
L. pauciseta Lang, 1936	*L. pauciseta* Lang, 1936
	L. noncapillata Lang, 1948
"campbelliensis" group	
L. campbelliensis Lang, 1934	*L. campbelliensis* Lang, 1934
"tenuispina" group	
L. tenuispina Lang, 1934	*L. tenuispina* Lang, 1934

Females	Males
"brevipes" group	
H. brevipes Roe, 1958	*H. brevipes* Roe, 1958
H. denticulata Roe, 1958	*H. denticulata* Roe, 1958
Heterolaophonte spec. Roe, 1960	

The following species cannot yet be brought to any of the above mentioned groups:

	Cleta setigera Kriczagin, 1873
C. similis var. *fortior* Kriczagin, 1873	
L. pygmaea T. Scott, 1894	
L. rottenburgi T. Scott, 1912	
L. australis T. Scott, 1912	
L. exigua T. Scott, 1912	
L. insignis T. Scott, 1914	
L. oculata Gurney, 1927	
L. laurentica Nicholls, 1941	*L. laurentica* Nicholls, 1941
H. furcata Noodt, 1958	

I have united three species described by Roe (1958, 1960), *Heterolaophonte brevipes*, *H. denticulata*, and *H.* spec., in a separate "brevipes" group since the three forms are allied closely and occupy a more or less isolated position among the other members of this genus.

Genus *Paronychocamptus* Lang, 1948

Created by Lang in 1944 (p. 35) but validated by him in 1948 (p. 1380) by the designation of a type species, *Laophonte curticaudata* Boeck, 1864.

The following species are known:

Females	Males
"curticaudata" group	
L. curticaudata Boeck, 1864	*L. curticaudata* Boeck, 1864
L. huntsmani Willey, 1923	*L. huntsmani* Willey, 1923
L. capillata C. B. Wilson, 1932	
"exigua" group	
L. exigua G. O. Sars, 1905	*L. exigua* G. O. Sars, 1905

Genus *Paralaophonte* Lang, 1948

This genus was introduced by Lang in 1944 (p. 36) but no type species was indicated; it was validated by Lang in 1948 (p. 1386) by the indication of a type species: *Cleta brevirostris* Claus, 1863. The following species are known:

FEMALES	MALES
"brevirostris" group	
Cleta brevirostris Claus, 1863	*C. brevirostris* Claus, 1863
(= *Laophonte herdmani* A. Scott, 1902)	
L. brevirostris f. *fissirostris* Willey, 1935	*L. b.* f. *fissirostris* Willey, 1935
L. Meinerti Brady, 1899	*L. Meinerti* Brady, 1899
L. congenera G. O. Sars, 1908	*L. congenera* G. O. Sars, 1908
L. congenera var. *mediterranea* Lang, 1948	*L. c.* var. *mediterranea* Lang, 1948
L. octavia Monard, 1935	
L. dieuzeidei Monard, 1936	*L. dieuzeidei* Monard, 1936
Paralaophonte lacerdai Jakobi, 1954	*P. lacerdai* Jakobi, 1954
"perplexa" group	
L. perplexa T. Scott, 1899	*L. perplexa* T. Scott, 1899
L. macera G. O. Sars, 1908	*L. macera* G. O. Sars, 1908
L. hyperborea G. O. Sars, 1909	*L. hyperborea* G. O. Sars, 1909
"gracilipes" group	
L. gracilipes Brady, 1910	*L. gracilipes* Brady, 1910
"karmensis" group	
L. longipes T. Scott, 1893	
L. karmensis G. O. Sars, 1911	*L. karmensis* G. O. Sars, 1911
L. quaterspinata Brian, 1917	*L. quaterspinata* Brian, 1917
L. tenera G. O. Sars, 1920	*L. tenera* G. O. Sars, 1920
L. taurina Monard, 1928	*L. taurina* Monard, 1928
L. zimmeri van Douwe, 1929	*L. zimmeri* van Douwe, 1929
L. lunata Willey, 1930	*L. lunata* Willey, 1930

The following species cannot be placed in any of the groups:

L. gurneyi Lang, 1934	*L. gurneyi* Lang, 1934
L. pseudo-oculata Krishnaswamy, 1959	*L. pseudo-oculata* Krishnaswamy, 1959

Two new species of the "karmensis" group will be described below as:

Paralaophonte spinicauda, new species	
	P. pilosoma, new species

Paralaophonte spinicauda, new species

FIGURES 132*b*, 133, 134*c,d*

MATERIAL.—Loc. 592, 1 ad. ♀, 0.40 mm.; 1 ov. ♀, 0.45 mm.

DESCRIPTION.—The following is based on the specimen of 0.40 mm. length (holotype), which has been dissected and mounted. The paratype is tubed separately.

Adult female, total length 0.40 mm.; greatest diameter 0.12 mm. General shape of body moderately elongate, especially in dorsal aspect, greatest diameter in oral region, very slightly narrowing posteriorly, dilated at genital somite (fig. 134*c*). Head and 1st

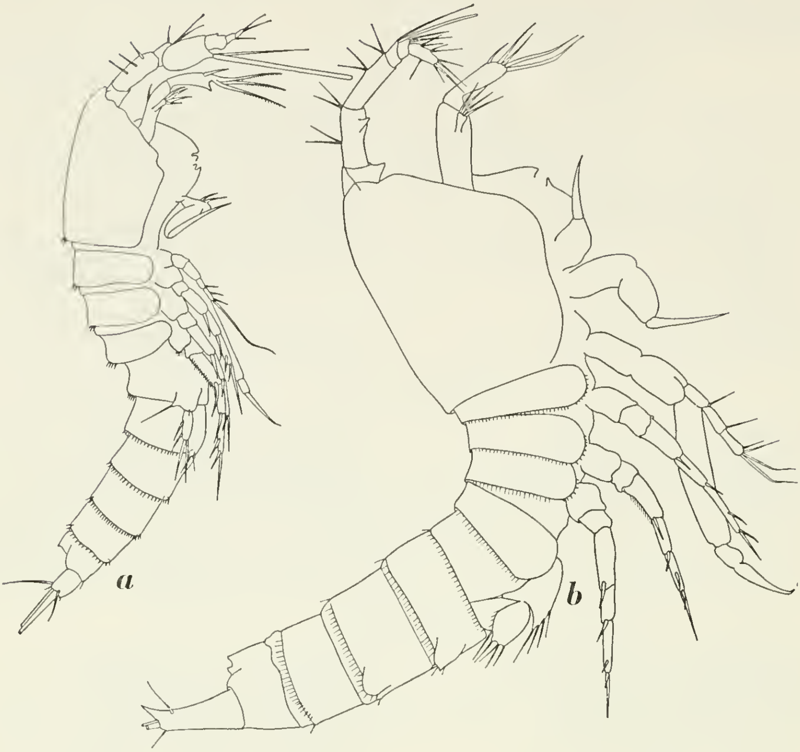

Figure 132.—*Esola longicauda* Edwards, loc. 592, ad. ♂: *a*, whole animal, lateral view from right side. *Paralaophonte spinicauda*, new species, loc. 592, ad. ♀, holotype: *b*, whole animal, lateral view from right side. (*a*, × 165; *b*, × 275.)

thoracic somite fused; cephalic somite occupies ⅓ of total body length. Sides of cephalic somite greatly produced to cover basal parts of oral appendages; oral field greatly produced. No ventrolateral projection on cephalic somite; back in lateral aspect curved, running into short rostrum (fig. 132*b*). Rostrum triangular, as long as 1st antennular segment, apex rounded, with two minor incisions carrying hairs of frontal organ. Thoracic somites 2 to 4 of equal length, epimeral plates distinct, rounded, bordered with spinules. 5th thoracic somite nearly as long as preceding somites, dorsal part of distal border fringed with fine, spiniform hairs.

Genital somite composed of fused somites 1 and 2, line of fusion distinct on dorsal surface. 3rd abdominal somite fully as long as 2nd, both with laterocaudally produced epimeral plates, bordered with spinules. Exact shape of laterocaudal projection can best be judged from figure 134*c*. 4th abdominal somite slightly shorter than preceding somite, distal borders of all abdominal somites fringed with spinules, forming completely closed rows. Anal somite twice as wide as long, with broad anal plate, fringed with spiniform hairs. Insertion of furcal rami also bordered with spinules (fig. 134*c*).

Furcal rami about twice as long as wide, cylindrical, length 35μ, diameter 17.5μ. Distal margin of each ramus produced in distinct, acutely pointed, obliquely upwardly directed spine (fig. 133*f*). 5 marginal setae and 1 appendicular seta on each ramus, placed close together at distal border; appendicular seta inserts near internal distal corner. Setae 1, 4, 5, and appendicular seta small, setae 2 and 3 lengthened and thickened, especially 2nd. In my specimen the furcal setae are damaged.

The whole carapace is covered with short hairs, each placed on a slightly elevated knob.

Antennules 6-segmented: 1st segment with small externally directed spine and haired internal border; spine on 2nd segment very strong, curved, externally directed; 3rd segment long; 4th short and with well-shaped conical process, bearing aesthetasc and 2 setae. Setation represented in figure 133*g*.

Antenna with allobasis, carrying single internal seta, and unsegmented exopodite with 4 setae. Endopodite with 7 appendages, 5 of which are marginal setae (fig. 133*h*).

Cutting edge of mandibular praecoxa with strong teeth. Palp well developed, unsegmented, with 2 setae.

Maxillular arthrite well developed, long, with 4 strong teeth and some smaller setae that could not be observed clearly, but one was found along proximal border of arthrite. Coxal endite well developed, slender, with 3 setae. No basal endite, basipodite unsegmented, with 1 seta representing exite, 2 setae representing exopodite, and 2 apical setae at place of endopodite (fig. 133*i*).

I obtained no suitable preparation of the maxilla.

Maxillipede (fig. 133*j*) of the usual, chelate type. Basis with straight internal border and slightly convex external margin. Endopodite unsegmented, slightly curved, without additional setae.

Leg 1 (fig. 133*a*) with 3-segmented exopodite and endopodite. Coxa and basis fairly big; basis with distinct socle bearing endopodite. Exopodal segments of same length, 2nd without internal seta. 3rd with total of 4 appendages, 2 of which are geniculate setae. Exopodite reaches halfway along 1st endopodal segment, which is large, 4½ times as long as wide, internal border with spiniform hairs. 2nd and 3rd endopodal segments indistinctly separate: 2nd with haired and swollen external margin, 3rd with fine seta near fusion with 2nd, claw-shaped; apex curved, pointed.

Legs 2 to 4 (figs. 133*b–d*) with 3-segmented exopodite and 2-segmented endopodites. All bases with haired external seta. The various particulars appear in figures 133*b–d* and the setal formula:

	endopodite	*exopodite*
leg 2	0. 220	1. 123
leg 3	0. 221	1. 223
leg 4	0. 121	1. 223

Leg 2. No seta at external border of 2nd endopodal segment; 2 setae at internal border fine. Seta at internal border of 2nd exopodal segment fine (fig. 133*b*).

Leg 3. Fine seta at external border of 2nd endopodal segment; 2 internal setae on this segment fine. Seta at external border of 2nd exopodal segment fine (fig. 133*c*).

Leg 4. 2nd endopodal segment with fine seta at internal and external border. 3rd exopodal segment notably short (fig. 133*d*).

Leg 5 (fig. 133*e*) with broad baso-endopodite, with 5 setae placed on distinct socles. Baso-endopodite reaching upper third of exopodite. Exopodite elongated-ovate, 2½ times as long as wide, with total of 5 setae, 4 of which are placed along border (1 internal, 1 apical, 2 external), while one is placed on small knob at anterior surface. External border coarsely haired. External lobe of baso-endopodite small, with fine seta.

Color faded, greenish yellowish. The paratype female carries a sac containing approximately a dozen eggs. No eye or pigmented spot observed.

REMARKS.—This species clearly belongs in the genus *Paralaophonte* as defined by Lang (1948, pp. 1385, 1386) and, in this genus, stands very near to *Laophonte taurina* Monard, 1928. *P. spinicauda* has almost the same setal formula and particularly corresponds to *L. taurina* in the presence of 5 setae along the margin of the baso-endopodite of leg 5. Lang (1948, p. 1387) is doubtful of the validity of Monard's species because of the presence of 5 setae on the baso-endopodite, 4 being the usual number in *Paralaophonte*. Lang appears to have confused the setation of the 3rd exopodal segment in leg 4 of *L. taurina*: on p. 1385 he mentions 2 internal setae on this segment; in the table on p. 1338 he gives the number there as 1, which agrees with Monard's description (Monard mentions a total of 6 appendages on this segment: 3 external, 2 apical, and 1 internal). The setation considered doubtful by Lang (1948, p. 1387) is actually found in *P. spinicauda*; there is no doubt that the setation given here is correct since the dissection was completely successful and not a single seta is missing from the legs. The fine seta on the anterior surface of the exopodite of leg 5 is not so easily observed; the socle, nevertheless, is quite conspicuous and by its presence the seta can be traced.

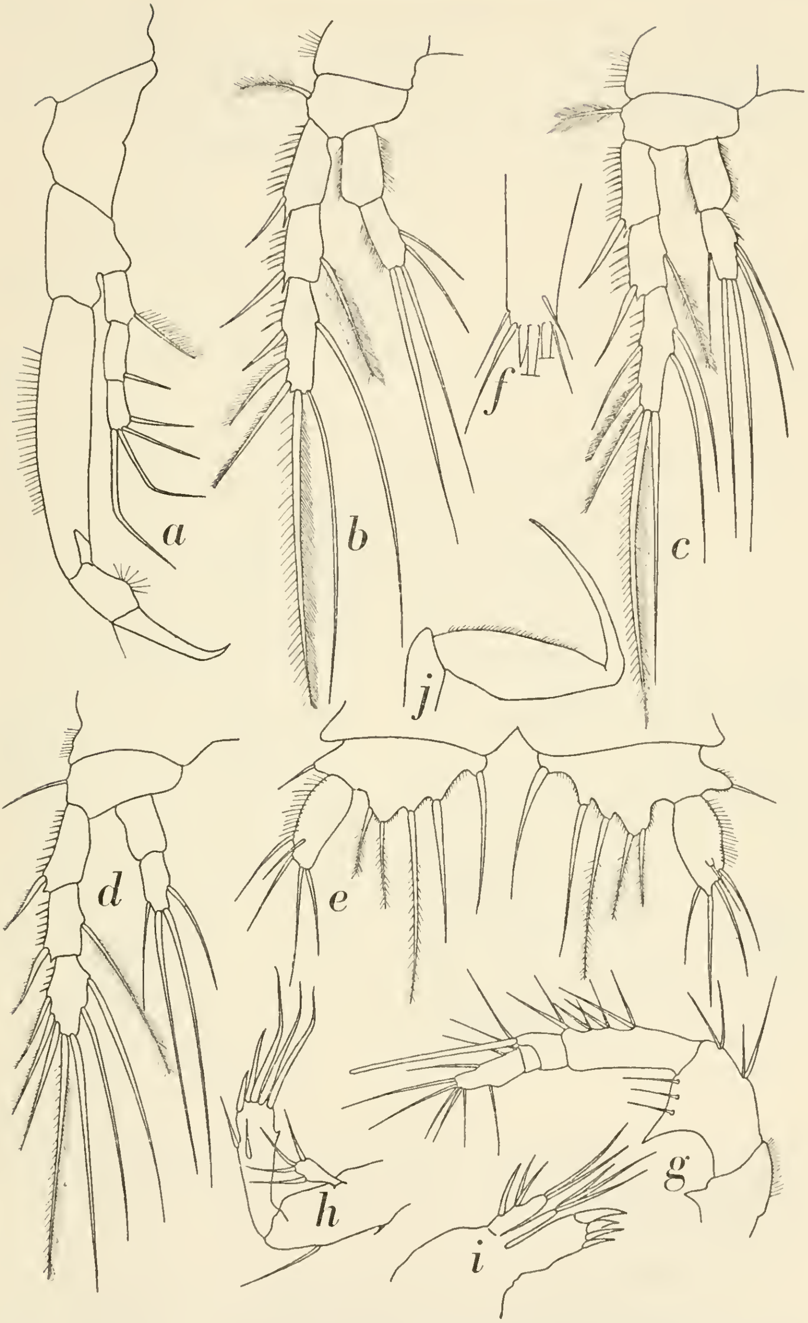

FIGURE 133.—*Paralaophonte spinicauda*, new species, loc. 592, ad. ♀, holotype: *a*, leg 1; *b*, leg 2; *c*, leg 3; *d*, leg 4; *e*, 5th legs; *f*, left furcal ramus, dorsal view; *g*, antennule; *h*, antenna; *i*, maxillule; *j*, maxillipede. (× 520.)

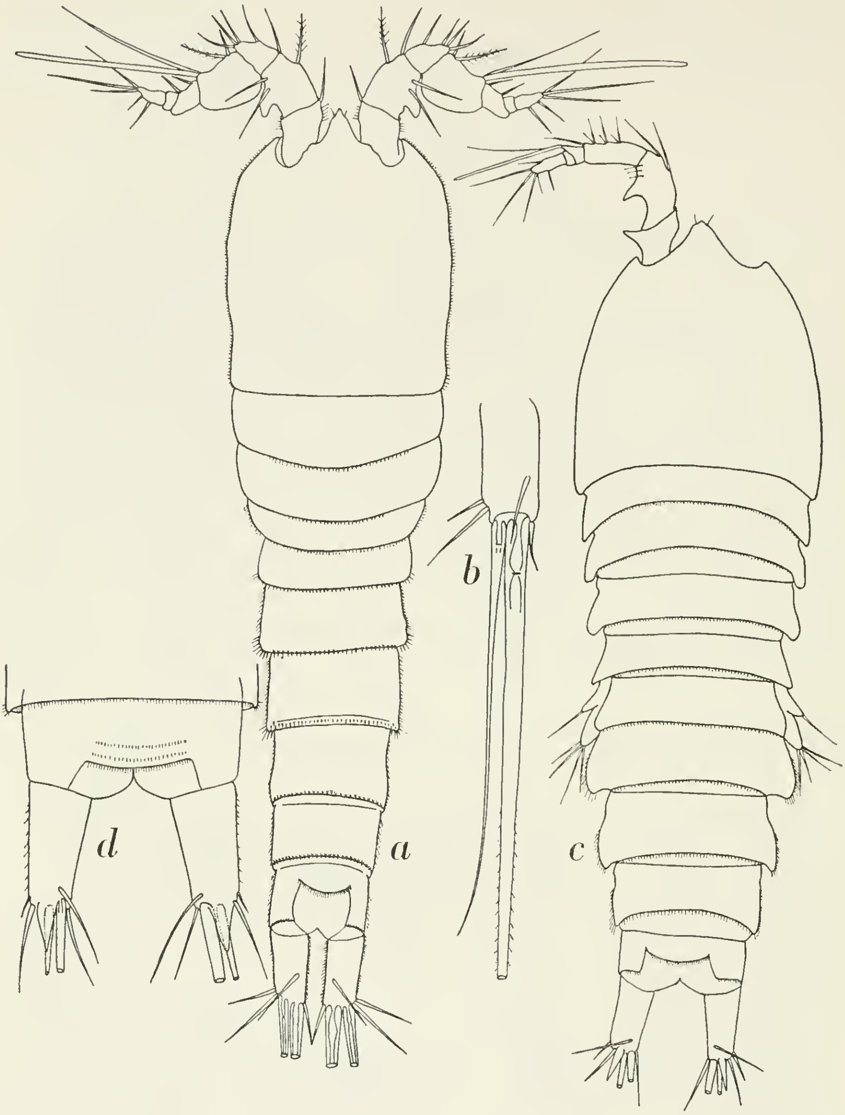

FIGURE 134.—*Paralaophonte pilosoma,* new species, loc. 638, ad. ♂, holotype: *a,* whole animal, dorsal view; *b,* left furcal ramus, dorsal view. *Paralaophonte spinicauda,* new species, loc. 592, ad. ♀, holotype: *c,* whole animal, dorsal view; loc. 592, ad. ♀, paratype: *d,* distal part abdomen and furca, dorsal view. (*a, c,* × 275; *b, d,* × 460.)

The present species is characterized especially by the spines on the 1st and 2nd antennular segments, the spine on the furcal rami, the setation of legs 2 to 4, and the characters of leg 5. Although closely allied to *L. taurina*, it differs in the setation of leg 4 and the shape of the exopodite of leg 5.

Two female specimens were obtained from a sand sample collected some 340 feet from the reef margin at Falarik in the Ifaluk Atoll.

Paralaophonte pilosoma, new species

FIGURES 131*f–k*, 134*a,b*, 135, 136*a*

MATERIAL.—Loc. 638, 1 ad. ♂, 0.47 mm.

DESCRIPTION.—The following is based on the only male specimen (holotype), which has been dissected and mounted.

Adult male, total length 0.47 mm.; greatest diameter 0.12 mm.; length of longest furcal seta 0.38 mm.; proportional length of cephalothorax and abdomen is 15:16.

General shape of body elongated, cephalothorax and abdomen indistinctly separate; greatest diameter at middle of cephalic somite, very gradually tapering posteriorly and only very slightly dilated in genital area (fig. 134*a*). Head and 1st thoracic somite fused; cephalic somite 1½ times longer than combined lengths of thoracic somites 2 to 4. Head broadly rounded anteriorly, incised at insertion of antennules, rostrum with broad base, triangular with rounded apex and very indistinctly incised at tip. Cephalic somite in lateral aspect with rounded back, rostrum pointing forward and slightly downward, separated from cephalic somite by shallow depression, as long as 1st antennular segment (fig. 136*a*). Sides of cephalic somite distinctly produced to cover oral appendages; posterolateral corner produced. Thoracic somites 2 and 3 of equal length, 4th slightly shorter. Epimeral plates of somites 2 to 4 cut off squarely. All thoracic somites, including cephalic somite, distally bordered by fine hairs.

5th thoracic somite distinctly visible dorsally and laterally, nearly as long as 4th thoracic somite. Abdominal somites 1 to 4 of equal length; 1st and 2nd separate, in dorsal aspect with slightly laterally produced epimeral plates. All abdominal somites bordered distally by short spinules, forming completely closed ring around somite. Anal somite as long as wide, anal flap distinct, placed proximally, haired, insertion of furcal rami also haired.

Furcal rami cylindrical, proportion of length and diameter 11:5. There are 5 marginal setae and 1 appendicular seta on each ramus, marginal setae inserting close together at distal border, appendicular seta at ⅔ length along internal border. Setae 1, 4, 5, and appendicular seta short, setae 2 and 3 lengthened and thickened, especially 2nd, which reaches ⅘ body length (fig. 134*b*).

The occurrence of short hairs on the whole integument, including the furcal rami, gives the animal a decidedly hirsute appearance; the hairs on the cephalic somite are placed in small pits.

Antennules (fig. 131*f*) short, ⅔ length of cephalic somite, subchirocerate, with prominent, outwardly directed, curved hook on 2nd segment. Segment 4 big and strongly swollen, with small conical process bearing aesthetasc and 2 setae. Apical 3 segments small, jointing indistinct; the complex articulates with 4th segment. Setation represented in figure 131*f*.

Antennal allobasis without setae; exopodite unsegmented, short, with 4 strong setae. Endopodite with 7 appendages, 5 of which are marginal setae (fig. 131*g*).

Cutting edge of mandibular praecoxa with 4 blunt, plate-shaped teeth. Palp small, unsegmented, with 4 setae and no trace of endopodite nor exopodite (fig. 131*h*).

Maxillule (fig. 131*i*) with well-developed, squarish arthrite, bearing 4 marginal teeth, 2 additional setae, and 1 basal seta. Coxal endite small, with 3 setae. No basal endite. Endopodite fused to basipodite, with 4 apical setae and isolated seta at external margin. Exopodite (or epipodite) small, styliform, with 2 small setae.

Maxilla (fig. 131*j*) with praecoxal, coxal and basal endites of equal length. Praecoxal endite with 2 spinulose setae, coxal endite with 2 nude setae, basal endite with coalescent, strong spine and additional seta. Endopodite completely reduced, represented by 2 setae inserting on basal endite.

Maxillipede (fig. 131*k*) of usual, chelate type. Coxa styliform, without seta. Basis with straight internal and swollen external margin with fine seta. Endopodite composed of 2 indistinctly separated segments, forming pointed, curved digit, slightly longer than basis. A fine seta inserts at line of fusion.

Leg 1 (fig. 135*a*) fairly long, coxa and basis elongate. Coxa with haired external border and haired tubercle at internal margin. Basis with strong, plumose, external seta, endopodite placed on big socle. Exopodite small, half length of 1st endopodal segment, 2-segmented, without internal seta. 2nd exopodal segment with 5 appendages. 1st endopodal segment styliform, 5 times as long as broad, internal margin haired, without setae. 2nd and 3rd endopodal segments fused to form slender, pointed digit with curved apex; fine seta occurs near line of fusion.

Leg 2 (fig. 135*b*) with strongly haired external tubercle at coxa. Basis with setose external seta. Exopodite 3-segmented, 1st segment without internal seta, 2nd with internal seta, 3rd with internal seta, apical spine and seta, and 3 outer edge spines. External margin of 1st and 2nd segments strongly spinulose. Endopodite 2-segmented, 1st segment styliform, without setae. Segment 2 with 2 internal and 2 apical setae. Inferior internal seta modified, basal part a thick rod, terminating in hook. Internal margin of rod haired, hairs gradually

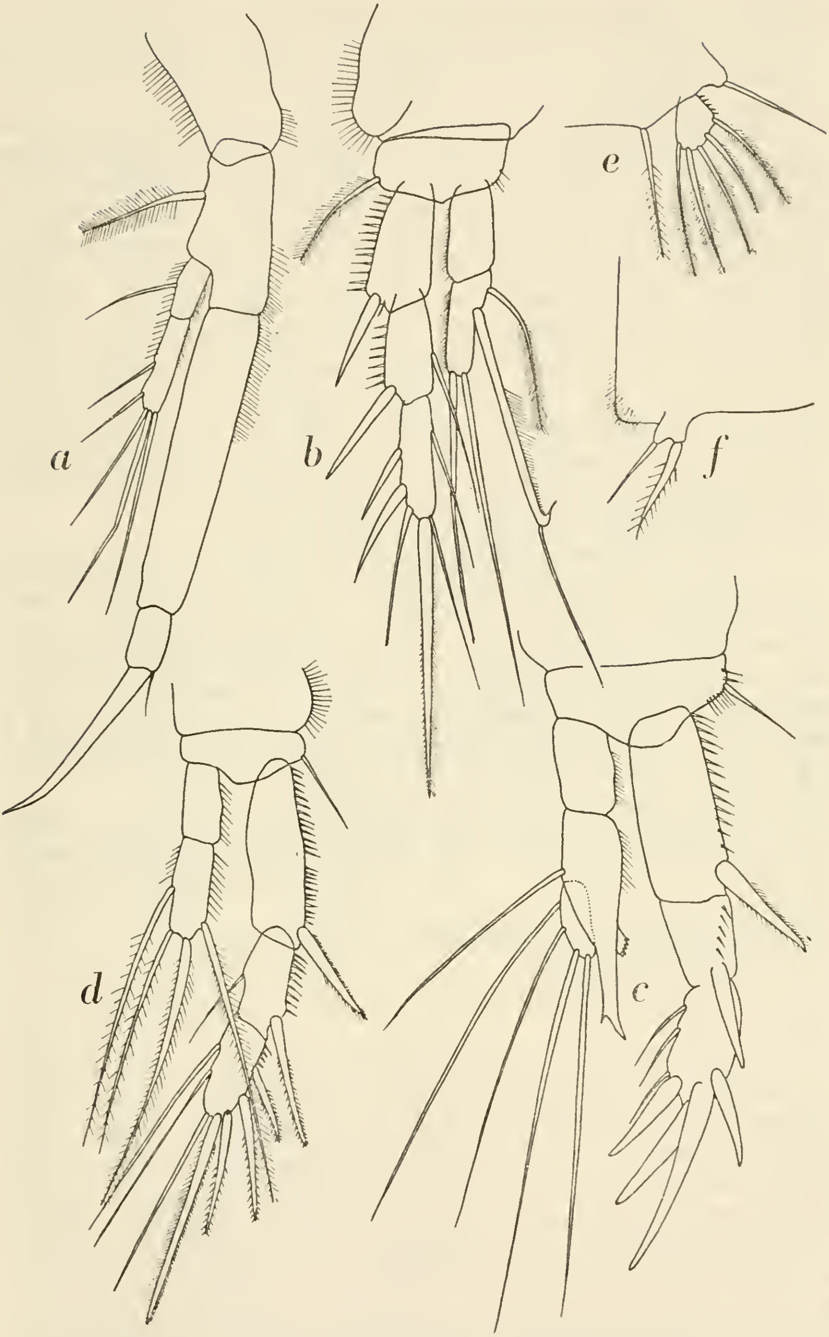

FIGURE 135.—*Paralaophonte pilosoma*, new species, loc. 638, ad. ♂, holotype: *a*, leg 1; *b*, leg 2; *c*, leg 3; *d*, leg 4; *e*, leg 5; *f*, leg 6. (× 625.)

changing in curved, fine lamellae. Apical part of seta normally developed. Apex of endopodite reaching articulation between 2nd and 3rd exopodal segments.

Coxa and basis of leg 3 (fig. 135*c*) as in leg 2; exopodite and endopodite 3-segmented, both modified. Exopodite with strongly swollen segments, curved internally and, in my preparation, slightly malformed by pressure of cover glass. Segment 1 without internal seta; external margin spinulose, with strong terminal spine. 2nd segment half as long, external margin as in 1st segment, apparently also without internal seta, though presence of such a seta may have been obscured by curved position of segment. Segment 3 slightly longer, with 3 strong spines at external margin, spine and fine seta at apex, and 2 short internal setae. 1st endopodal segment without setae; 2nd externally produced into strong spine with bifid apex, overlapping 3rd segment and reaching middle of 3rd exopodal segment. Base of spine with denticulate lamella. In addition, there is an internal seta. 3rd endopodal segment small, with 4 plumose setae.

Leg 4 (fig. 135*d*) with basis and coxa as in legs 2 and 3; exopodite 3-segmented, endopodite 2-segmented. Exopodite curved, though less strongly than in 3rd leg; 1st segment long, without internal seta and with strong external spine. 2nd segment half length of 1st, with fine internal seta and strong external spine. 3rd segment as long as 2nd, with 3 strong external spines, spine and seta at apex, and 2 internal setae. 1st endopodal segment without setae; 2nd with total of 4 setae: 1 external, 1 apical, and 2 internal.

Leg 5 (fig. 135*e*) with scarcely elevated baso-endopodite, bearing 1 seta. Exopodite ovate, small, with 5 plumose marginal setae, external margin spinulose. External lobe well produced, with fine seta.

Leg 6 (armature of genital plates) composed of 2 setae, one of which is spinulose (fig. 135*f*).

Color faded, transparently whitish. No eye or pigmented spot visible.

REMARKS.—This new species shows certain points of conformity with the male of *Paralaophonte karmensis* (G. O. Sars) and probably belongs in the "karmensis" group of *Paralaophonte.* The exact place, in absence of the female, cannot accurately be ascertained The species is different from *P. karmensis* by the strongly developed hook on the 2nd antennular segment and the shape of legs 2 and 4. *P. karmensis* is a rare species, which appears not to have been recorded since Sars' original description of this species from Skudeneshavn at the southern end of Karmoy in Norway. The male specimen of *P. pilosoma* originated from crevices in the seaward reef margin at Falarik in the Ifaluk Atoll.

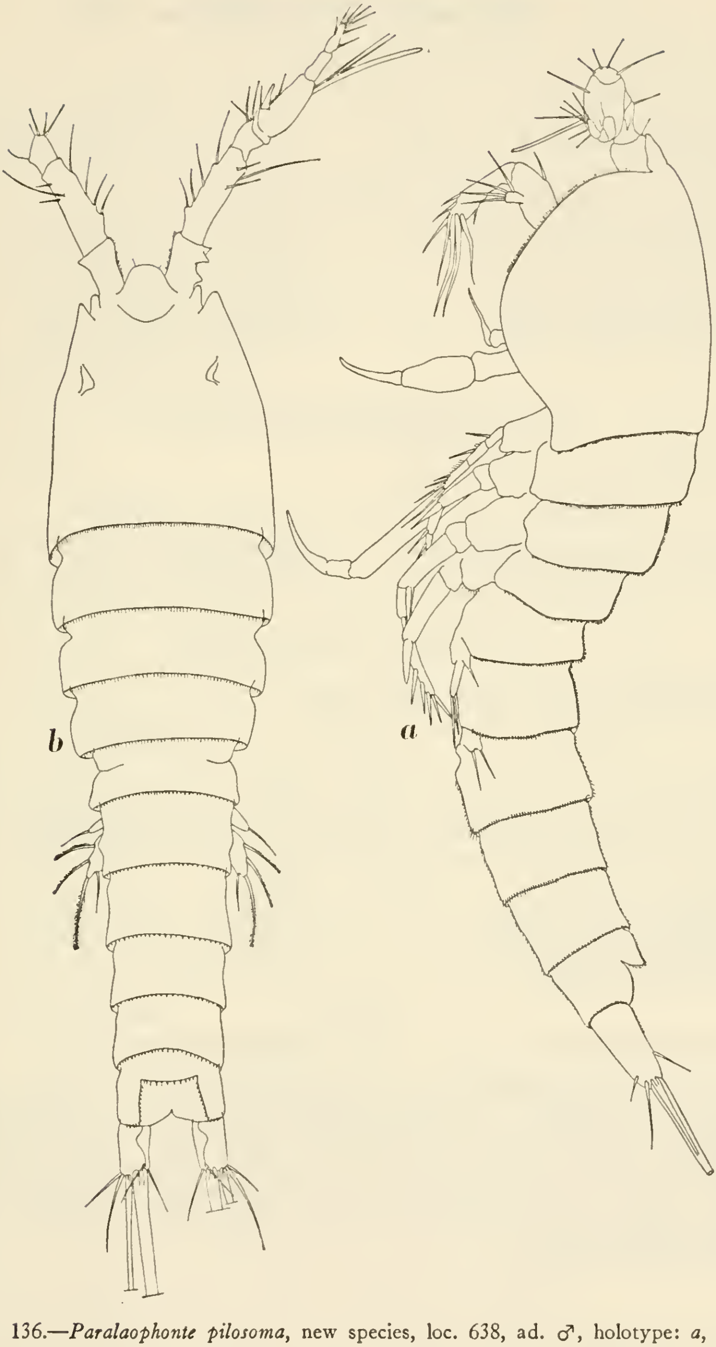

FIGURE 136.—*Paralaophonte pilosoma*, new species, loc. 638, ad. ♂, holotype: *a*, whole animal, lateral view from left side. *Esola longicauda* var., loc. 592, ad. ♂: *b*, whole animal, dorsal view. (× 275.)

Genus *Asellopsis* Brady and Robertson, 1873

The following species are now recognized:

FEMALES	MALES
Asellopsis hispidus Brady and Robertson, 1873	*A. hispidus* Brady and Robertson, 1873
(=*A. hispida* Brady and Robertson, 1873)	
Laophonte intermedia T. Scott, 1895	*L. intermedia* T. Scott, 1895
A. duboscqui Monard, 1926	*A. duboscqui* Monard, 1926
A. sarmatica Jakubisiak, 1938	*A. sarmatica* Jakubisiak, 1938
A. littoralis Nicholls, 1939	*A. littoralis* Nicholls, 1939
A. arenicola Chappuis, 1955	*A. arenicola* Chappuis, 1955
A. chappuisius Krishnaswamy, 1957	*A. chappuisius* Krishnaswamy, 1957

Genus *Platychelipus* Brady, 1880

Two species are now known:

FEMALES	MALES
Platychelipus littoralis Brady, 1880	*P. littoralis* Brady, 1880
P. laophontoides G. O. Sars, 1908	*P. laophontoides* G. O. Sars, 1908

Genus *Esola* Edwards, 1891

The following species are now known:

FEMALES	MALES
"longicauda" group	
Esola longicauda Edwards, 1891	*E. longicauda* Edwards, 1891
(= *Laophonte bulbifera* Norman, 1911; *L. rhodiaca* Brian, 1928)	
L. hirsuta Thompson and A. Scott, 1903	*L. hirsuta* Thompson and A. Scott, 1903
L. longiremis T. Scott, 1904	
L. typhlops G. O. Sars, 1908	*L. typhlops* G. O. Sars, 1908
L. bulligera Farran, 1913	
L. rosei Monard, 1926	
"spelea" group	
L. spelea Chappuis, 1938	*L. spelea* Chappuis, 1938

I have halfheartedly followed Lang's suggestion to consider *Esola longicauda* Edwards, *Laophonte bulbifera* Norman, and *Laophonte rhodiaca* Brian as synonyms of one variable species. The reasons for doing so have been given below. Many specimens of this species occur in the Ifaluk collection and I have found the variability fairly restricted (see below).

Esola longicauda Edwards, 1891

FIGURES 132*a*, 137*a,b*, 138, 139, 141*c*

Esola longicauda Edwards, 1891, p. 81, pl. 3 (figs. 16–26).—Lang, 1944, p. 37; 1948, p. 1409, figs. 571 (no. 1), 572.—Noodt, 1955, p. 91, figs. 96–100.—Petkovski, 1955, p. 126.

Laophonte bulbifera Norman, 1911, p. 137, pl. 28 (figs. 1–7).—Sewell, 1940, pp. 312, 325, 352, 359, 366, 371.—Nicholls, 1941, p. 423; 1941b, pp. 98–101; 1945, p. 10.

Laophonte rhodiaca Brian, 1928, pp. 29–37, figs. 122–129.—Nicholls, 1941, p. 423; 1941b, p. 105, 107; 1945, p. 10, fig. 6a.

MATERIAL.—Loc. 590, 1 ov. ♀, 0.32 mm.; 1 ad. ♂, 0.29 mm. Loc. 592, 1 ♀ cop. stage V, 0.39 mm.; 1 ad. ♀, 0.51 mm.; 5 ad. ♂♂, 0.27–0.41 mm. (0.36 mm.).

DESCRIPTION.—The following is based on a female of 0.51 mm. and a male of 0.41 mm., both from locality 592; they have been dissected and mounted.

Adult female, total length 0.51 mm.; greatest diameter 0.12 mm.; length of longest furcal seta 0.41 mm.

General shape of body slender, greatest diameter at end of cephalic somite, anteriorly rounded, posteriorly very gradually narrowing, slightly broader in genital region. Head and 1st thoracic somite fused; cephalic somite as long as combined lengths of thoracic somites 2 to 4 (fig. 137*b*). Back in lateral aspect almost straight, anterior part curving into rostrum, which forms solid protuberance on head, directed obliquely forward and downward, reaching middle of 1st antennular segment (fig. 137*a*). Sides of cephalic somite considerably produced to shield oral appendages. Rostrum, in dorsal aspect, with fairly broad base, apex cut off squarely, with two fine hairs of frontal organ. Two cup-shaped depressions in integument of cephalic somite, one on each side of middorsal line behind insertion of antennules, probably representing eyes. 2nd to 4th thoracic somites of equal length; epimeral plates of these somites rounded and bordered with spinules.

5th thoracic somite distinctly visible dorsally and laterally, fairly short. 1st and 2nd abdominal somites, forming genital somite, of equal length, with distinct line of fusion and with epimeral plates with distinct laterocaudally produced flap. 3rd and 4th abdominal somites of same length, each slightly longer than preceding somite, 3rd also with laterocaudally produced epimeral plates. Anal somite, half as long as wide, with broadly rounded anal flap bordered with fine hairs. All somites of body, including cephalic and anal somites, have their distal border fringed with small spinules.

Furcal rami (fig. 138*g*) characteristically shaped, slightly longer than anal somite. External furcal wall almost straight; internal border strongly swollen proximally; swelling bordered on dorsal

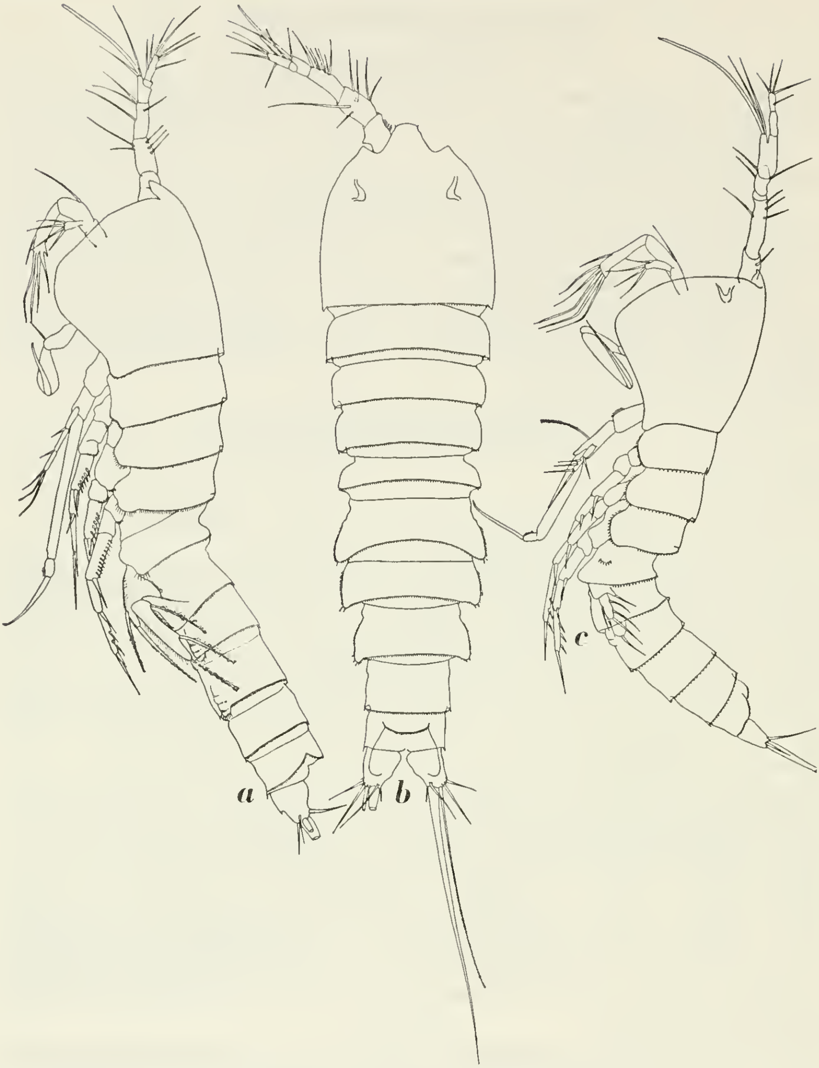

FIGURE 137.—*Esola longicauda* (Edwards), loc. 592, ad. ♀: *a*, whole animal, lateral view from left side; *b*, same animal, dorsal view. *Esola longicauda* var., loc. 592, ad. ♂: *c*, whole animal, lateral view from left side. (× 165.)

aspect of furcal ramus by low ridge. Each ramus with 5 marginal setae and 1 appendicular seta. Setae 1, 4, 5, and appendicular seta fine, latter borne on small knob at internal extremity of ramus. Setae 2 and 3 lengthened and thickened, especially 2nd, which reaches ⅘ length of body.

Whole carapace covered by short hairs, particularly visible on cephalic somite.

Antennules (fig. 138*f*) short, slightly shorter than cephalic somite, 6-segmented. 1st segment with 2 teeth, placed in different planes, with the result that only one is visible in dorsal aspect. Segment 4 with small conical process, bearing aesthetasc and 2 setae.

Since the antenna and mouth parts are identical with those of the male, of which I obtained a better dissection, those of the female will be described with the male.

Leg 1 (fig. 138*a*) with big basis, carrying fine external seta and spinulose internal tubercle. Exopodite 2-segmented, without internal setae. 2nd exopodal segment with 5 appendages; 2 geniculate apical setae very long. 1st endopodal segment styliform, 4 times as long as exopodite, 6 times as long as wide; internal border with number of very strong hairs. 2nd and 3rd endopodal segments fused, with small seta near line of fusion, forming pointed, curved digit.

Legs 2 to 4 with 3-segmented exopodites and 2-segmented endopodites; 1st endopodal segment of these legs without setae. The details of these legs appear from figures 138*b–d* and the setal formula:

	endopodite	*exopodite*
leg 2	0.221	0.1.123
leg 3	0.321	0.1.223
leg 4	0.221	0.1.223

Leg 5 big, baso-endopodite and exopodite lengthened, reaching end of 2nd abdominal somite. Baso-endopodite reaching ⅓ length of exopodite, with total of 4 setae, median seta placed almost at proximal end of internal margin. Exopodite 4 times as long as wide, with total of 6 setae. Shape and arrangement of setae can best be judged from figure 138*e*. External lobe big, with strong seta. Whole 5th leg densely haired.

Color strongly faded, opaque greenish, cup-shaped depressions of cephalic somite transparently greenish.

Adult male, total length 0.41 mm.; greatest diameter 0.12 mm.; length of longest furcal seta 0.37 mm.

Body slenderer than in female, with cephalothorax and abdomen well separated. Various somites of body stand out very clearly because of shallow ring-shaped constrictions at beginning of each somite (fig. 141*c*). Head and 1st thoracic somite fused, rostrum smaller than in female, rounded anteriorly, reaching half length of 1st antennular segment. Cephalic somite longer than combined lengths of thoracic somites 2 to 4, laterally scarcely produced, with the result that conical oral field is free for observation (fig. 132*a*). Thoracic somites 2 to 4 of equal length, epimeral plates rounded, nude.

5th thoracic somite short, visible dorsally and laterally. Abdominal somites 1 to 4 of equal length, 1st and 2nd completely free. None of abdominal somites with laterally produced epimeral plates. Anal somite as in female. All abdominal and thoracic somites distally bordered with fine spinules. On anal somite fine patch of spinules at end of carina running from insertion of anal plate backwards.

Furcal rami different from those of female, cylindrical, 1½ times as long as wide, with huge, internal, chitinized swelling at internal margin. 5 marginal setae and 1 appendicular seta; development of these as in female.

Antennules (figs. 139*f,g*) 6-segmented, subchirocerate: 1st segment with two blunt teeth placed in different planes; 2nd segment fairly long; 4th segment strongly swollen, with subapical conical process, carrying aesthetasc and 2 fine setae. In addition, there is a deepened longitudinal groove, into which fit the apical two segments; the proximal end of the groove is marked by a thick tooth, carrying a curiously shaped seta. The apical segment probably results from the fusion of two smaller parts. Setation represented in figure 139*f*.

Antenna (fig. 139*h*) with unsegmented exopodite, carrying 4 setae. Allobasis with single internal seta. Endopodite slender, with 6 appendages, 4 of which are marginal setae. External margin of endopodite with 2 small teeth and larger apical spine.

Mandible reduced; cutting edge of praecoxa with some rounded teeth and globular swelling at internal border. Palp unsegmented, with 3 marginal setae; endopodite absent, exopodite represented by single seta.

Maxillule (fig. 139*i*) with squarish arthrite, carrying 5 teeth and basal seta. There is only one endite, apparently the coxal, carrying 2 setae. Basipodite and endopodite fused, styliform, with 2 apical setae. Exopodite strongly reduced, represented by 2 setae.

Maxilla with 5 endites: 2 praecoxal, 2 coxal, and 1 basal. Proximal 4 endites rather small, each with 3 setae. Basal endite larger, with slender spine, coalescent with endite, and 2 setae. No trace of endopodite.

Maxillipede (fig. 139*j*) of usual type, chelate, coxa with 2 apical internal setae. Internal margin of basis straight, external margin swollen. Endopodite unsegmented, styliform, forming slender digit, slightly longer than basis and curved at apex.

Leg 1 (fig. 139*a*) with big coxa and basis; exopodite 2-segmented, endopodite 3-segmented. Coxa with large external, haired swelling. Basis with external seta; endopodite inserting on big socle, internal border of which is haired and carries seta. Two exopodal segments of nearly equal length, 1st without internal setae; 2nd with total of 5 appendages. Exopodite reaches ⅙ length of 1st endopodal segment; this segment is styliform, 7 times as long as wide, and has strongly haired internal border. 2nd and 3rd endopodal segments fused, with small seta near line of fusion, forming slender digit, of which apex is pointed and slightly curved.

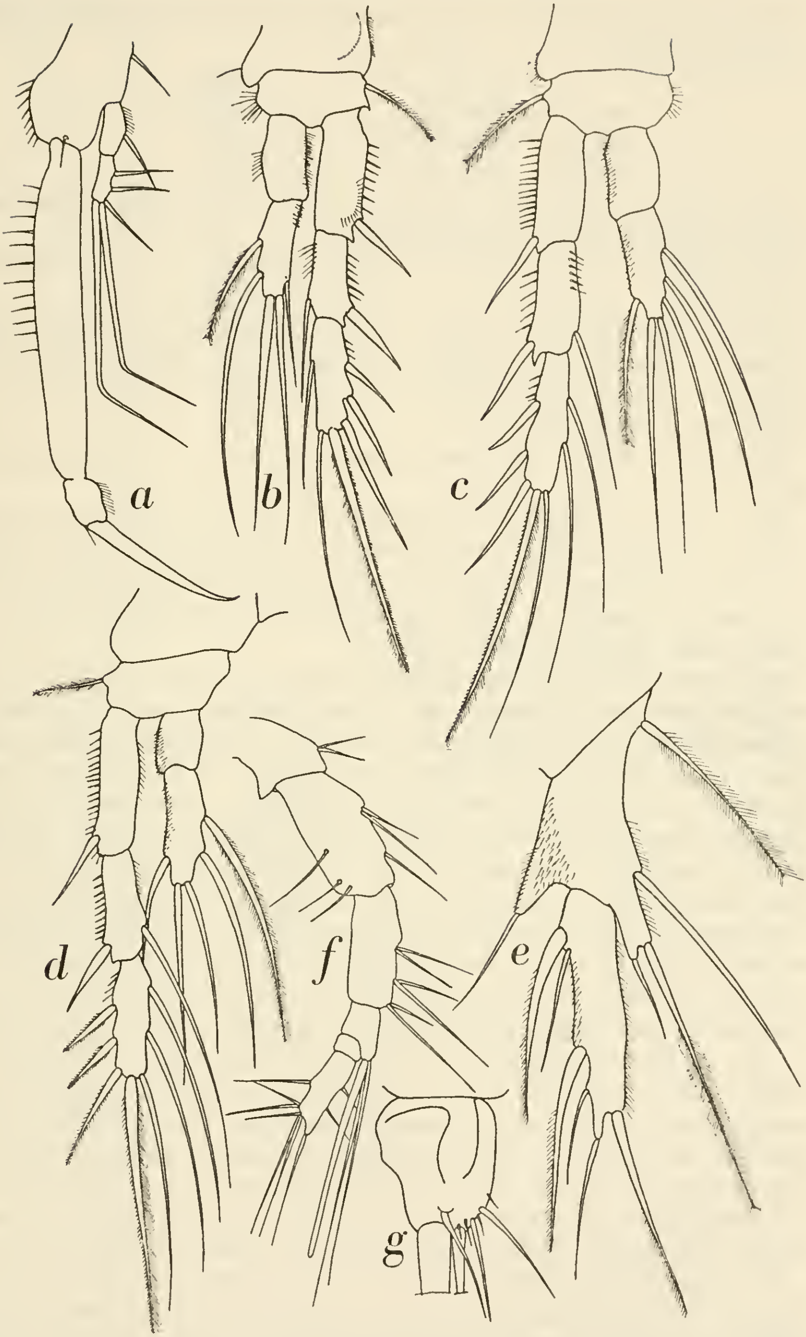

FIGURE 138.—*Esola longicauda* (Edwards), loc. 592, ad. ♀ : *a*, leg 1; *b*, leg 2; *c*, leg 3; *d*, leg 4; *e*, leg 5; *f*, antennule; *g*, right furcal ramus, dorsal view. (× 520.)

The particulars of legs 2 to 4 appear in figures 139*b–d* and the following setal formula:

	endopodite	*exopodite*
leg 2	0.221	0.1.123
leg 3	0.1.4 (modified)	1.223
leg 4	0.221	1.223

Legs 2 and 4 with 3-segmented exopodite and 2-segmented endopodites, leg 3 with both rami 3-segmented.

Leg 2 (fig. 139*b*). No seta at internal border of 1st endopodal segments.

Leg 3 (fig. 139*c*). No seta at internal surface of 1st endopodal segment; segment 2 externally lengthened into strong, spiniform projection, reaching beyond 3rd segment, which is small, apex cut off obliquely, with 4 setae.

Leg 4 (fig. 139*d*). No seta at internal border of 1st endopodal segment.

Leg 5 (fig. 139*e*) much smaller than in female; external lobe big, with strong seta; baso-endopodite scarcely developed, with some spiniform hairs. Exopodite 3 times as long as wide, with total of 5 setae (2 external, 2 apical, 1 internal), development of which appears in figure 139*e*. External margin haired.

REMARKS.—The material of *Esola longicauda* in the Ifaluk collection falls into two groups, one of which is described above as *E. longicauda* Edwards, while the other, represented by a single male, is described below as an unnamed variety of this species. I would have been inclined to separate these two forms specifically but for the fact that, from the literature available, *E. longicauda* appears as a very variable species, variable in the length of the antennules and the setation of the endopodites. Although, in all specimens recorded above, the antennules are short and, in the specimens dissected, the 1st endopodal segments of legs 2 to 4 lack the internal setae, it appears from a scrutiny of the literature that very different conditions of setation of the endopodites have been recorded; also evident is variability in length of the antennular segments. Though the possibility that several closely allied species are present cannot be altogether avoided, I have been forced, by the lack of material, to leave this question open, with the result that the identification of the present Ifaluk specimens is provisional. Bearing the above recorded variability in mind, I do not feel justified in describing the aberrant male specimen as a new species and I have, therefore, entered it here as an unnamed variety.

The geographical distribution of *E. longicauda* has been discussed by Sewell (1940, p. 326) and Lang (1948); its area of distribution includes localities in the northern temperate Atlantic, the tropical Atlantic, the Mediterranean, and the Suez Canal zone. The length of specimens

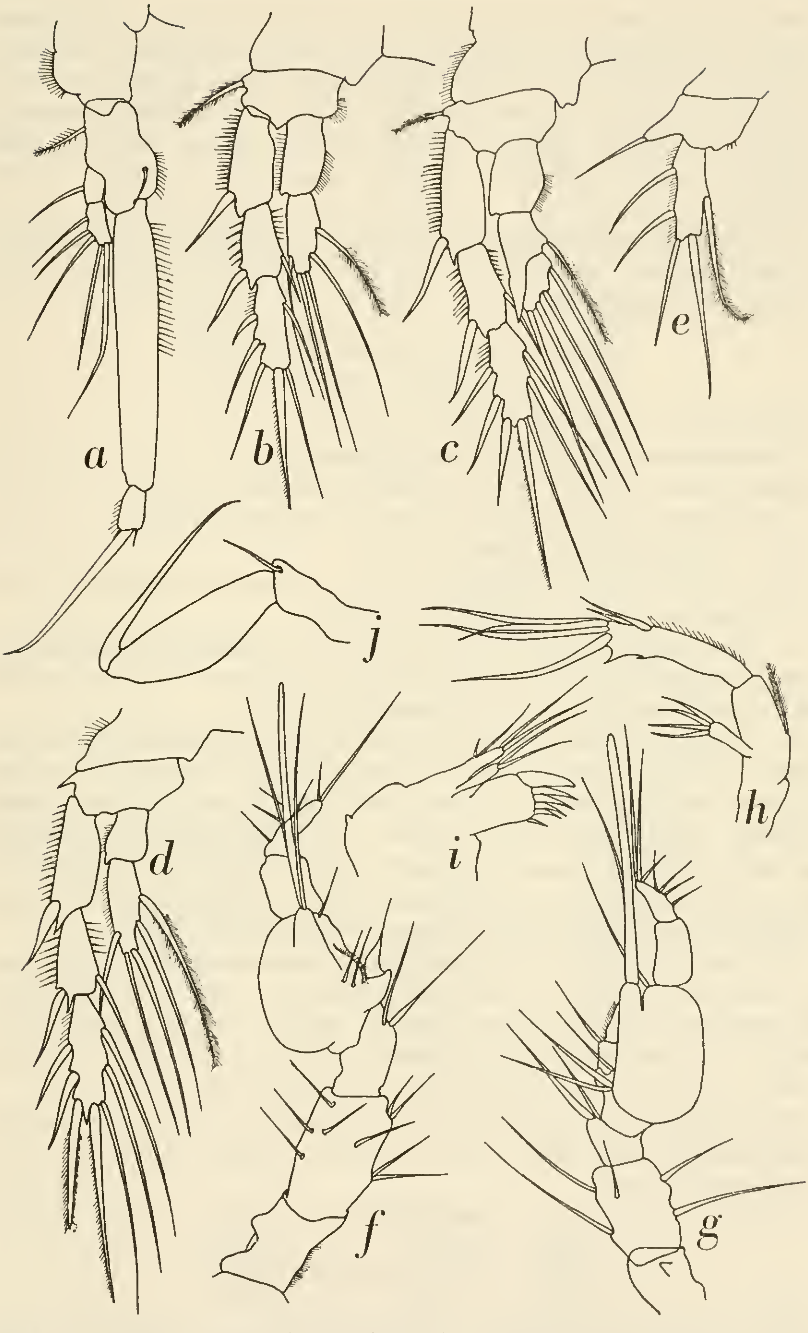

FIGURE 139.—*Esola longicauda* (Edwards), loc. 592, ad. ♂: *a*, leg 1; *b*, leg 2; *c*, leg 3; *d*, leg 4; *e*, leg 5; *f*, antennule; *g*, same antennule, slightly inverted position; *h*, antenna; *i*, maxillule; *j*, maxillipede. (× 520.)

from these areas is: ♀ 0.6–0.8 mm.; ♂ 0.42–0.5 mm. Additional records from the Pacific area have since become available: Nancowry Harbour in the Nicobar Islands; Addu Atoll in the Maldive Archipelago (Sewell, 1940: in weed washings, ♀ 0.62 mm.); Port Denison in Western Australia (Nicholls, 1945: ♂ 0.46 mm.). Noodt (1955) records a female specimen of 0.79 mm. from the Sea of Marmara off Turkey.

In the Ifaluk collection, specimens of *E. longicauda* occur exclusively in sand samples, taken 80–340 feet from the reef margin at Falarik in the Ifaluk Atoll.

Esola longicauda Edwards, 1891, variety

FIGURES 136*b*, 137*c*, 140

MATERIAL.—Loc. 592, 1 ad. ♂, 0.42 mm.

DESCRIPTION.—The following is based on the above-mentioned male specimen, which has been dissected and mounted.

Adult male, total length 0.42 mm.; greatest diameter 0.12 mm.; length of longest furcal setae 0.45 mm.

The general shape of the body is the same as in the typical *Esola longicauda* except for the following points:

1. Demarcation between cephalothorax and abdomen less distinct than in typical species since narrowing in diameter is more gradual and cephalic somite more lengthened (fig. 136*b*).
2. Cephalic somite, near insertion of antennules, with lateral incision, with the result that very distinct pair of lateral, forwardly directed horns present. Rostrum with broad base, separated from cephalic somite by distinct groove. The cup-shaped depressions at the antennular bases, which are scarcely visible in the male of the typical species, are very prominent here. Sides of cephalic somite greatly produced to shield oral parts completely (fig. 137*c*).
3. Antennules (fig. 140*f*) greatly lengthened compared with typical species; all segments, but particularly 1st, 2nd, and 4th, are longer. 1st segment with two lateral spines; distal, at least on right side, bifid. 4th segment, as it is lengthened, appears less swollen. Conical process long, and longitudinal groove bordered with stiff hairs.
4. No difference in structure of abdomen, antenna and oral appendages. Legs (figs. 140*a–d*) are nearly identical but have different setal formula:

	endopodite	*exopodite*
leg 2	1.221	0.1.123
leg 3	1.1.4 (modified)	0.1.223
leg 4	1.221	0.1.223

Leg 5 (fig. 140*e*) almost as in typical species, but 5 exopodal setae have slightly different distribution, as appears in comparison between

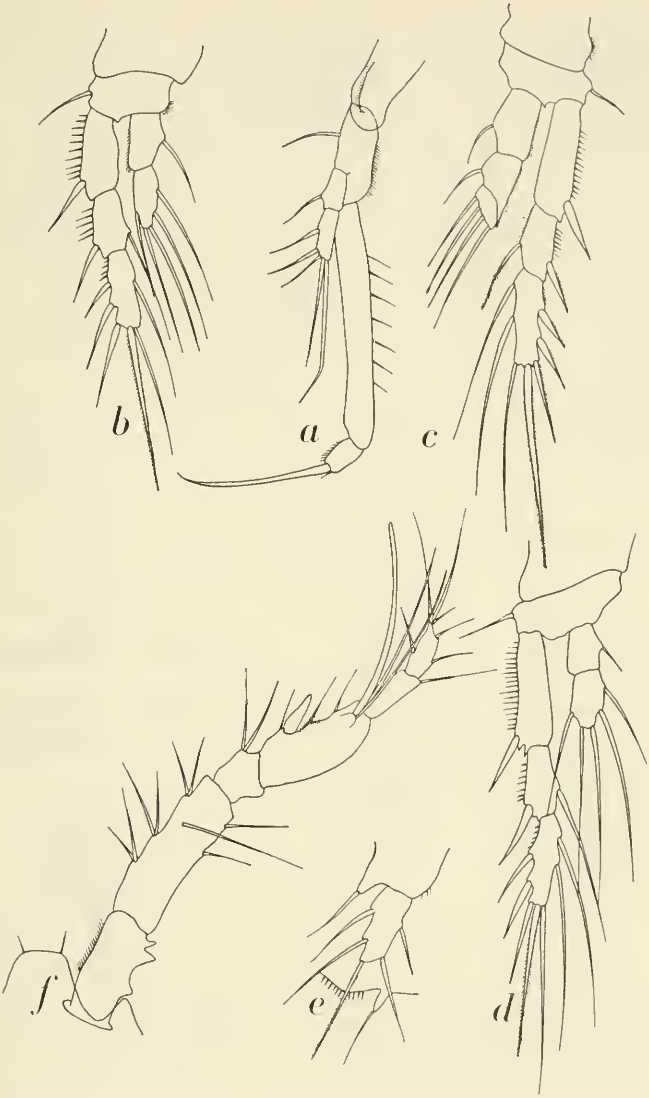

FIGURE 140.—*Esola longicauda* var., loc. 592, ad. ♂: *a*, leg 1; *b*, leg 2; *c*, leg 3; *d*, leg 4; *e*, legs 5 and 6; *f*, rostrum and right antennule, dorsal view. (× 460.)

figures 139*e* and 140*e*. The armature of the genital plate apparently consists of a single seta, placed on a big socle (fig. 140*e*).

REMARKS.—A single specimen of this slightly aberrant male specimen occurred in a sand sample taken some 340 feet from the reef margin at Falarik in the Ifaluk Atoll. This variety has been discussed, together with the typical species, on p. 352.

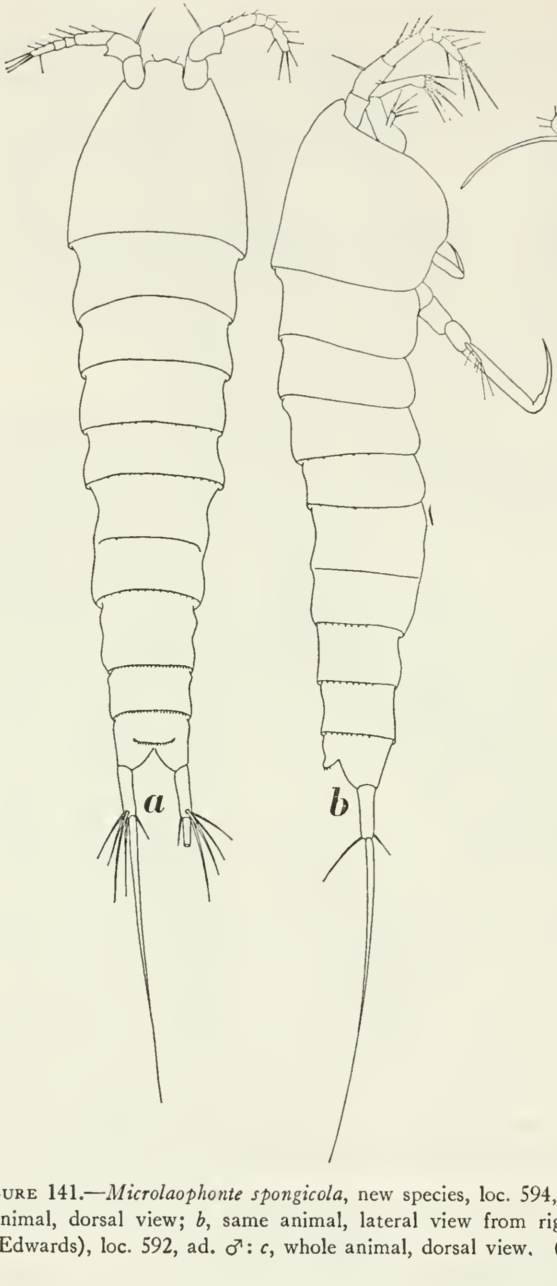

FIGURE 141.—*Microlaophonte spongicola*, new species, loc. 594, ad. ♀, holotype: *a*, whole animal, dorsal view; *b*, same animal, lateral view from right side. *Esola longicauda* (Edwards), loc. 592, ad. ♂: *c*, whole animal, dorsal view. (× 210.)

Genus *Moerephonte* Jakobi, 1953

The sole species of this genus is *Moerephonte catharinensis* Jakobi, 1953, of which only the male is known. This genus I am inclined to regard with the greatest doubt. Leg 2 is said to have a completely reduced endopodite, a fact due very probably to damage during dissection of the small species (0.25 mm.), which would also account for the very aberrant setal formula. The genus *Moerephonte* almost certainly is congeneric with *Esola;* the species described and inadequately figured is probably nothing else but *Esola longicauda* Edwards.

The drawing of the dorsal aspect of this species gives the impression of the presence of a heavy spine on the cephalic somite in the mid-dorsal line, but no such spine is visible in the lateral view (Jakobi, 1953, fig. 3). It seems probable that the cup-shaped integumental depressions have been observed but have not been too correctly figured. The actual number of specimens, recorded from the tidal zone at Itapocoroy and Pôrto Belo along the Atlantic coast of Brazil, is not given in Jakobi's paper, but it is hoped that some specimens from the lot studied by Jakobi are still available in order that a much needed redescription of the material can be given.

Genus *Pseudolaophonte* A. Scott, 1896

The following species are now recognized:

FEMALES	MALES
Laophonte spinosa I. C. Thompson, 1893	*L. spinosa* I. C. Thompson, 1893
(=*Pseudolaophonte aculeata* A. Scott, 1896)	
Pseudolaophonte proteus Klie, 1950	*P. proteus* Klie, 1950

Genus *Onychocamptus* Daday, 1903

The following species are now included in this genus:

FEMALES	MALES
"mohammed" group	
Laophonte mohammed Blanchard and Richard, 1891	*L. mohammed* Blanchard and Richard, 1891
(=*Onychocamptus heteropus* Dady, 1903; *L. calamorum* Willey, 1923; *L. humilis* Brian, 1929)	
L. chathamensis G. O. Sars, 1905	*L. chathamensis* G. O. Sars, 1905
L. talipes C. B. Wilson, 1932	*L. talipes* C. B. Wilson, 1932
L. bengalensis Sewell, 1934	*L. bengalensis* Sewell, 1934
Onychocamptus besnardi Jakobi, 1954	*O. besnardi* Jakobi, 1954
"horridus" group	
Cleta horrida Norman, 1876	*C. horrida* Norman, 1876
L. horrida var. *trispinosa* Lang, 1936	
L. brevispinosa G. O. Sars, 1908	*L. brevispinosa* G. O. Sars, 1908
L. armiger Gurney, 1927	*L. armiger* Gurney, 1927
(*L. hystrix* Brian, 1928; *L. steueri* van Douwe, 1929)	
L. mirabilis Gurney, 1927	

A new species will be described below as:

Onychocamtpus gladiator, new species

Because of the general resemblance of this new species with *O. armiger* (Gurney), this species too has been redescribed.

The following keys can be used to discriminate between the various species of the, now restricted, genus *Onychocamptus*.

Key to the Species of *Onychocamptus*

FEMALES

1. Baso-endopodite of leg 5 with 4 or 5 setae 2
   Baso-endopodite of leg 5 with 3 setae 6
2. 3rd exopodal segment of leg 2 with 2 external marginal spines 3
   3rd exopodal segment of leg 2 with 3 external marginal spines 4
3. Segment 2 of antennule with externally directed spine. Lateral swellings on cephalic somite each with backwardly directed spine. Endopodite of maxillipede a huge claw . . . . **O. gladiator,** new species
   Segment 2 of antennule smooth. No spine on lateral swellings of cephalic somite. Endopodite of maxillipede slender . . . . **O. armiger** (Gurney)
4. 3rd exopodal segment of leg 4 with 3 external marginal spines. **O. mirabilis** (Gurney)
   3rd exopodal segment of leg 4 with 2 external marginal spines 5
5. Distal margin of 4th abdominal somite dorsally with 3 or 4 bifid teeth. **O. horridus** (Norman)
   Distal margin of 4th abdominal somite dorsally with 2 bifid teeth. **O. brevispinosus** (G. O. Sars)
6. Exopodite of leg 5 more or less fused to baso-endopodite, no articulation is present 7
   Exopodite and baso-endopodite of leg 5 distinctly articulating 8
7. 3rd exopodal segment of leg 4 with 3 external marginal spines. **O. bengalensis** (Sewell)
   3rd exopodal segment of leg 4 with 2 external marginal spines. **O. besnardi** Jakobi
8. Setae of leg 5 short and spiniform . . . . **O. talipes** (C. B. Wilson)
   Setae of leg 5 normally developed. **O. mohammed** (Blanchard and Richard)

MALES

1. Exopodite of leg 5 fused with baso-endopodite 2
   Exopodite of leg 5 free and articulating with baso-endopodite 3
2. 2nd endopodal segment of leg 3 with external spiniform prolongation. **O. besnardi** Jakobi
   2nd endopodal segment of leg 3 without external prolongation. **O. bengalensis** (Sewell)
3. 3rd exopodal segment of leg 2 with 2 external marginal spines. **O. armiger** (Gurney)
   3rd exopodal segment of leg 2 with 3 external marginal spines 4
4. 2nd endopodal segment of leg 3 without external spiniform prolongation . . 5
   2nd endopodal segment of leg 3 with external spiniform prolongation . . . 6
5. Exopodite of leg 5 with 3 setae . . . . . . **O. chathamensis** (G. O. Sars)
   Exopodite of leg 2 with 2 setae . . . . **O. talipes** (C. B. Wilson)
6. Body smooth, haired, but without spines. **O. mohammed** (Blanchard and Richard)
   Body with big, backwardly directed spines . . . . **O. horridus** (Norman)

The genus *Onychocamptus* Daday, in the sense of Lang (1948, p. 1415), makes a very heterogeneous impression and subsequently has been reduced by Noodt (1958, p. 94) by the removal of the former "kliei" group, which at the same time received generic rank and now is known as the genus *Klieonychocamptus* Noodt, 1958. The next step would be to remove the "horridus" group, characterized by the 6-segmented antennules in the female and the strongly spinulose body of both sexes. A generic name for this group, indeed, has already been introduced by Nicholls (1941b, p. 95), who suggested the generic name *Echinolaophonte*, a name which cannot be recognized until a type species has been indicated by Dr. Nicholls. I have therefore left the "horridus" group in the genus *Onychocamptus*, hoping the indication of a type species for *Echinolaophonte* will soon be arranged.* The generic name *Onychocamptus* Daday, 1903, will then only apply to Lang's "mohammed" group.

Onychocamptus armiger (Gurney, 1927)

FIGURES 142, 143, 144*a*, 146*c–e*

Laophonte armiger Gurney, 1927, p. 554, fig. 159.—Sewell, 1940, pp. 313, 359, 367, 368.

Onychocamptus armiger.—Lang, 1948, p. 1423, figs. 571 (no. 2), 580.—Carvalho, 1952, p. 159, pl. 2 (figs. 68–71).—Petkovski, 1955, p. 126.

Laophonte hystrix Brian, 1928, pp. 30, 37, figs. 130–142.

Laophonte steueri van Douwe, 1929, pp. 286, 291, figs. 16–21.

MATERIAL.—Loc. 589, 1 ad. ♂, 0.59 mm. Loc. 590, 1 ad. ♀, 0.51 mm.

DESCRIPTION.—The following is based on the above-mentioned specimens; both have been dissected and mounted.

Adult female, total length 0.51 mm.; greatest diameter 0.16 mm.; length of longest furcal seta 0.14 mm.

Body of very characteristic appearance, which cannot possibly be described in detail but can best be appreciated by reference to figures 142*a*,*b*. Body depressed dorsoventrally; head and 1st thoracic somite fused to form cephalic somite, which, with rostrum, is ⅓ total body length. Cephalic somite swollen, on each side with big, rounded lateral swelling. Here body reaches greatest diameter; posteriorly it narrows very gradually; demarcation between cephalothorax and abdomen very indistinct; genital area slightly dilated (fig. 142*a*). Between lateral swellings cephalic somite distinctly depressed in middorsal line; pit bordered by irregularly chitinized ridges and,

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*I am sorry that I have overlooked Nicholls' legitimate indication of a type for the genus *Echinolaophonte* (Nicholls, 1941b, p. 95), the type being *Cleta horrida* Norman, 1876. The genus *Echinolaophonte* Nicholls, 1941, therefore, has a legitimate standing. Its species are: *Cleta horrida* Norman, 1876; *Laophonte brevispinosa* G. O. Sars, 1908; *Laophonte armiger* Gurney, 1927; *Laophonte mirabilis* Gurney, 1927; and the species described here as *Onychocamptus gladiator;* in addition, *Laophonte horrida* var. *trispinosa* Lang, 1936, belongs in the genus.

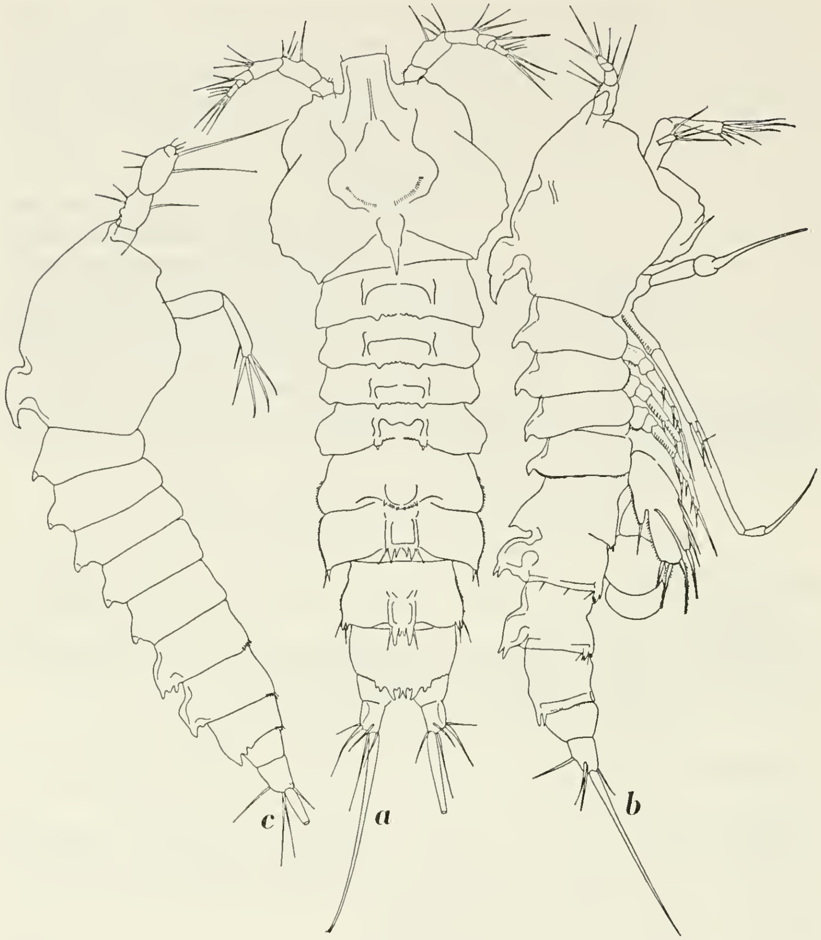

FIGURE 142.—*Onychocamptus armiger* (Gurney), loc. 590, ad. ♀: *a*, whole animal, dorsal view; *b*, same animal, lateral view from right side; loc. 489, ad. ♂: *c*, whole animal, lateral view from right side. (× 165.)

caudally, by row of hairs. At the posterior end of the cephalothorax there is, in the median plane, a big, caudally directed highly chitinized spine, placed on an elevated part of the cephalothorax, forming a socle. Rostrum present as flat plate, truncate at apex and carrying two fine hairs in two small incisions; rostrum reaches half length of 2nd antennular segment and is slightly curved downward. Dorsal surface of cephalic somite with number of chitinized ridges, whole integument has very distincly pitted structure. Thoracic somites 2 to 5 of nearly equal length, epimeral plates rounded. In middorsal line each of somites carries strongly chitinized, backwardly directed quadrangular part, of which the corners are produced in spines. Between spines, which slightly overlap following somite, border is denticulated.

Genital somite formed by partial fusion of 1st and 2nd abdominal segments; line of fusion distinct dorsally. Epimeral plates laterally produced, wing-shaped, that of 1st somite rounded, of 2nd caudally produced in some small spines. Quadrangular median plate of 1st somite with 6 teeth along free edge; that of 2nd somite very strongly produced, forming on each side strong external spine and smaller internal spine. In addition, there is on each side a hair near the insertion of the external spine. 3rd abdominal somite as long as, but much narrower than, preceding somite; epimeral plates not laterally produced and with some small spinules. Armature of quadrangular plate as in 2nd somite, but less strongly developed. 4th abdominal somite as long, and as wide, as 3rd, without quadrangular plate, but with distal margin dorsally produced in number of spines, overlapping anal somite and completely covering anal plate. Anal somite small, half as long as 4th, anal flap invisible.

Furcal rami slightly longer than broad (proportion 5:4), slightly diverging. Internal and external borders smooth. There are 5 marginal setae and 1 appendicular seta, the position of which appears from figure 142*a*; 2nd seta on each side is lengthened, reaching ¼ body length, and bluntly pointed.

Antennules (fig. 142*a*) slender, ¾ length of cephalic somite, 6-segmented: segments 2 and 3 long; segment 4 with small conical process, bearing aesthetasc and 2 fine setae; segment 1 without spines but with haired tubercle.

Antenna (fig. 146*c*) with short, unsegmented exopodite, bearing 4 strong setae. Endopodite with 7 marginal setae and 2 spines.

Mandible and maxillule heavily damaged in my preparation. Maxilla (fig. 146*d*) with 3 endites; praecoxal and coxal endites small, each with 2 setae. Basal endite better developed, with big, curved spine, coalescent with endite. In addition, there is a fine seta; endopodite represented by 2 setae.

Maxillipede (fig. 146*e*) with long and slender coxa. Basis elongate, internal border straight, external border slightly swollen. Endopodite represented by single, slender digit, curved at apex and longer than basis. No additional setae on endopodite.

Leg 1 (fig. 143*a*) very long and slender, brought about by great length of basis. External margin of coxa haired; internal and external margins of basis haired; in addition, there is a seta at the external basal margin. Exopodite very small, 2-segmented, both segments of equal length, 2nd with 5 appendages. 1st endopodal segment 4 times as long as exopodite, styliform, nude. 2nd and 3rd endopodal segments fused to form bluntly pointed digit.

Legs 2 to 4 with 3-segmented exopodite and 2-segmented endopodite. All bases with fine external seta. The various details of the legs can be taken from figures 143*b–d* and from the setal formula:

	endopodite	*exopodite*
leg 2	0.120	0.1.122
leg 3	0.220	0.1.222
leg 4	0.120	0.1.222

Leg 5 (fig.143*e*) big, foliaceous. Baso-endopodite very slightly shorter than exopodite, with 4 setae; external lobe big, with fine seta. Exopodite triangular, with 3 short, plumose setae.

Color greenish, with chitinized spines on back yellowish. The specimen carries a ball composed of 4 big eggs.

Adult male, total length 0.59 mm.; greatest diameter 0.14 mm.; length of longest furcal seta 0.17 mm.

General shape of body slenderer than in female; the principal points of difference are:

1. Though the general pattern of armature is nearly identical, there are small differences in the length of the spines, as appears from a comparison of figures 144*a* and 142*a*; the median spine on the cephalic somite does not point as far backward as in the female.

2. Abdominal somites 1 and 2 separate; epimeral plates scarcely produced laterally; ventral border of abdominal somites 2 to 4 with some spinules.

3. Antennules subchirocerate, 6-segmented: segment 1 with haired tubercle; segment 2 with small, blunt tooth; segment 4 strongly swollen, with short conical process, bearing aesthetasc and 2 setae; apical 3 segments fused, in this specimen clasped against 4th and almost hidden in its concavity. Setation represented in figure 143*f*.

4. Antenna, oral appendages, and legs as in female, with exception of leg 3 and leg 5. Leg 3 (fig. 143*g*) different from that of female by stronger development of exopodite. External marginal spines of exopodal segments 1 and 2 strong; on 3rd segment there are 2 slender and long external marginal spines, spine and seta at apex, and 2 internal setae. Lang (1948, p. 1424) gives the number of spines at the external margin of this segment as 3. Leg 5 (fig. 143*h*) small, baso-endopodite practically absent, without setae or spinules. External lobe well developed, with fine seta. Exopodite small, 1½ times as long as wide, quadrate, with 3 marginal, plumose setae. Armature of genital plates (leg 6) composed of 2 setae placed at slightly elevated part of distal wall of 1st abdominal somite (fig. 143*i*).

REMARKS.—In the shape of the cephalic somite, there is some difference between *Laophonte armiger* as described by Gurney (1927,

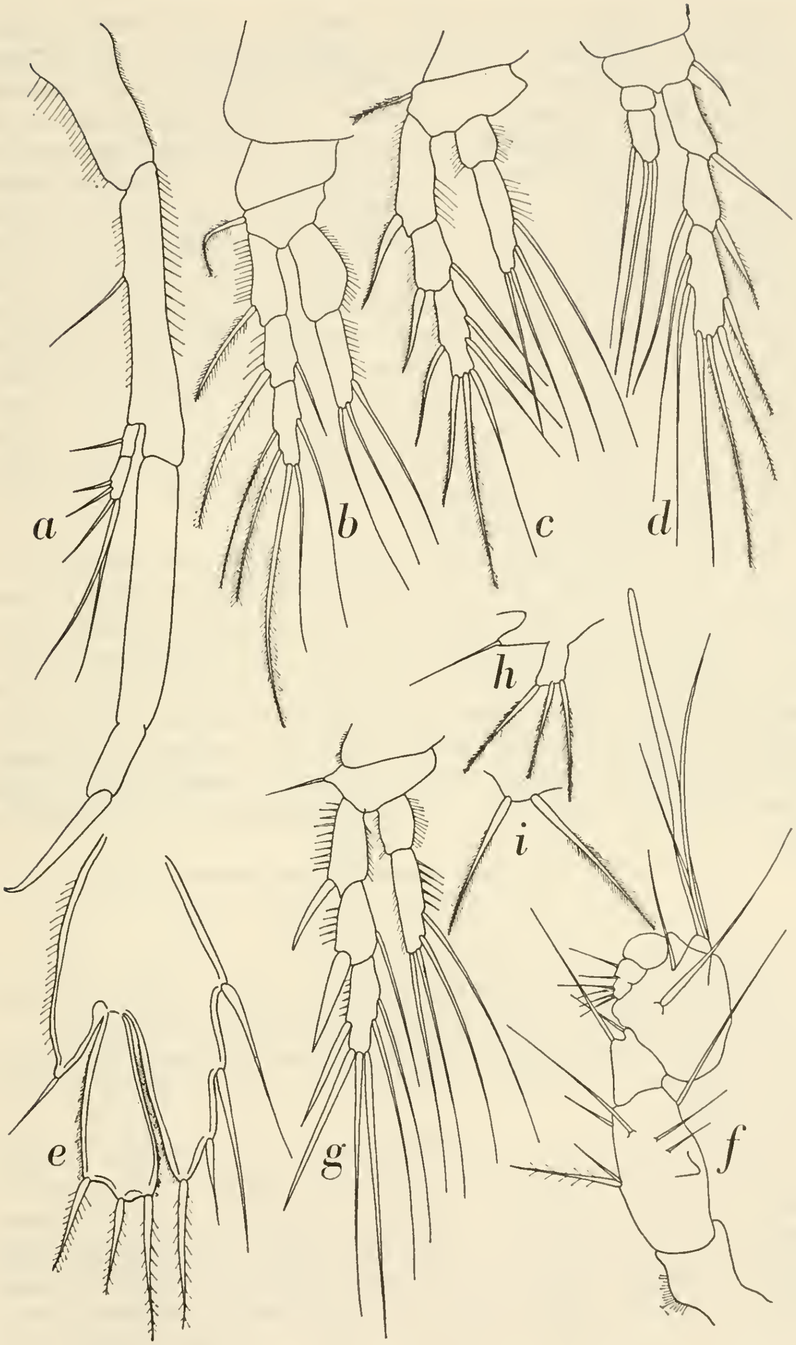

FIGURE 143.—*Onychocamptus armiger* (Gurney), loc. 590, ad. ♀: *a*, leg 1; *b*, leg 2; *c*, leg 3; *d*, leg 4; *e*, leg 5; loc. 489, ad. ♂: *f*, antennule; *g*, leg 3; *h*, leg 5; *i*, leg 6. (× 520.)

p. 554, fig. 159a) and the present specimen. The lateral cephalic expansions in Gurney's specimen appear to have been obtusely pointed; they are rounded in the Ifaluk specimen. A median cephalic carina appears to have been present in Gurney's specimen; in the Ifaluk specimen indications of a carina occur behind the rostrum, followed by a deep depression extending as far as the cephalic spine; this condition does not appear from Gurney's description, nor from his figure. Two cephalic depressions are mentioned in Willey's description (Willey, 1930, p. 107, fig. 65), but in his observations of the lateral aspect of the animal the exact size of the depressions may have been obscured by the lateral swellings. Willey's observation, therefore, may have been incorrect. The Ifaluk female, in body shape, is identical with *L. steueri* van Douwe, 1929 (pp. 286, 291, figs. 16–21), a species considered identical with *L. armiger*. Since there are no differences in the structure of any of the appendages, it seems likely that in the shape of the body there is, in this species, a considerable degree of variability.

The geographical distribution of this species has been discussed by Lang (1948, p. 1424). It has been recorded from the Atlantic coast of Brazil (Carvalho, 1952), from the Bermuda Islands (Willey, 1930), from various localities distributed over the whole Mediterranean (see Lang, 1948), and from the Suez Canal zone (Gurney, 1927). Two specimens were found in sand samples taken 60–80 feet from the reef margin on Falarik in the Ifaluk Atoll; they apparently represent the first Pacific specimens. The length of the Atlantic and Mediterranean specimens, according to Lang, is ♀ 0.48–0.65 mm., ♂ 0.49–0.54 mm.

***Onychocamptus gladiator*, new species**

Figures 144*b*,*c*, 145, 146*a*,*b*

Material.—Loc. 638, 1 ad. ♀, 0.42 mm.

Description.—The following is based on the above-mentioned specimen (holotype), which has been dissected and mounted.

Adult female, total length 0.42 mm.; greatest diameter, measured between spines of cephalic somite, 0.12 mm.; length of longest furcal seta 0.30 mm.

General shape of body resembling that of *Onychocamptus brevispinosus* G. O. Sars; body is slender, slightly depressed dorsoventrally, without distinct separation between cephalothorax and abdomen. Greatest diameter of body between cephalic lateral spines; body narrows very gradually posteriorly and is slightly dilated in genital region (fig. 144*b*). Head and 1st thoracic somite completely fused, cephalic somite as long as combined lengths of thoracic somites 2 to 5. Shape of cephalic somite very characteristic; can best be appre-

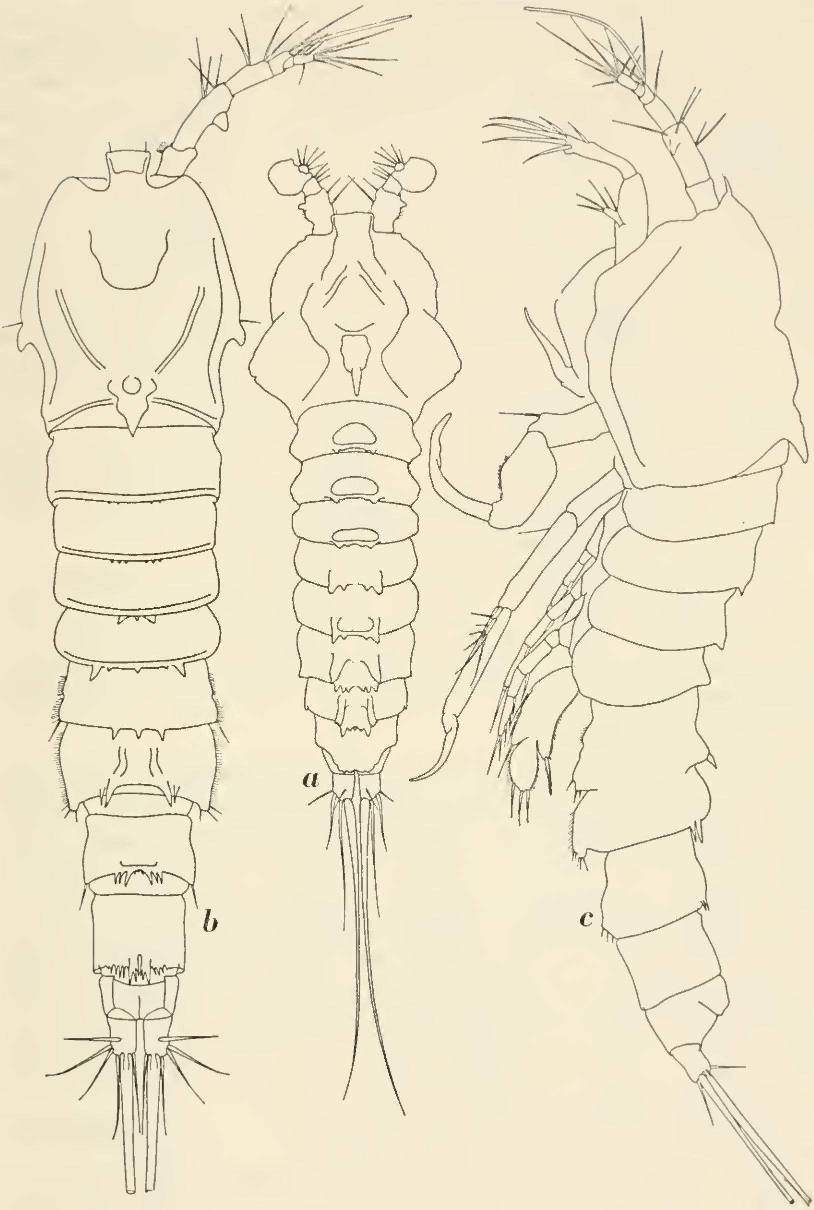

FIGURE 144.—*Onychocamptus armiger* (Gurney), loc. 489, ad. ♂: *a*, whole animal, dorsal view. *Onychocamptus gladiator*, new species, loc. 638, ad. ♀, holotype: *b*, whole animal, dorsal view; *c*, same animal, lateral view. (*a*, × 165; *b*, *c*, × 275.)

ciated by reference to figures 144*b*,*c*. Lateral parts of cephalic somite distinctly swollen; more elevated part of sides marked by presence of pair of lateral spines, preceded by stiff hair; spines directed caudally. Cephalic somite produced laterofrontally at sides of antennular insertions to form pair of "cheeks." Sides of cephalic somite not greatly produced with the result that oral parts and conical oral field are free for observation (fig. 144*c*). Distinct, backwardly directed median spine almost at distal end of cephalic somite. Spine smaller than in preceding species and with only its tip overlapping 2nd thoracic somite. From socle of this spine radiate four chitinized ridges, two laterocaudally, two laterofrontally. In middorsal line, two depressions: shallow depression in front of cephalic spine, and much deeper and larger depression halfway between spine and rostrum; latter depression surrounded by ridge.

Rostrum thin plate with broad base and truncate apex, placed between insertion of antennules, reaching length of 1st antennular segment. Base and sides of rostral plate chitinized, central part thin; two fine hairs indicate presence of frontal organ.

Thoracic somites 2 to 5 of equal length, distally provided with thickened ridge, bearing some spines. Distribution of these spines as follows: thoracic somite 2, four small chitinized knobs; somite 3, 6 small chitinized knobs; somite 4, 2 big lateral spines flanking a small median spine; segment 5, small median spine flanked on each side by small spine and big spine.

Genital somite composed of partly fused abdominal somites 1 and 2, showing distinct line of fusion dorsally. Epimeral plates of both somites expanded laterally, lateral walls haired; laterocaudal angle of 1st somite with a strong hair, of somite 2 with some spinules. Distal wall of somite 1 with 3 spines (1 median, 2 lateral), somite 2 with median elevated part, slightly overlapping abdominal somite 3, and provided on each side with 2 spines. Abdominal somites 3 and 4 of equal length; sides of somite 3 caudally with 3 hairs on each side; distal dorsal wall on each side with group of 3 spines. Dorsal part of distal wall of somite 4 strongly armed with bifid teeth, covering part of anal somite and obscuring anal plate.

Anal somite half as long as somite 4; anal plate, just visible between spines of somite 4, smooth, broadly rounded.

Furcal rami 1½ times as long as broad, parallel, slightly tapering caudally. Internal and external margins smooth. 5 marginal setae and 1 appendicular seta. All setae, with exception of seta 2, short; seta 2 greatly lengthened and thickened, ¾ body length.

Whole body strongly haired; hairs generally short, but better developed on cephalic somite, where placed in small pores, which give integument of cephalic somite a pitted structure.

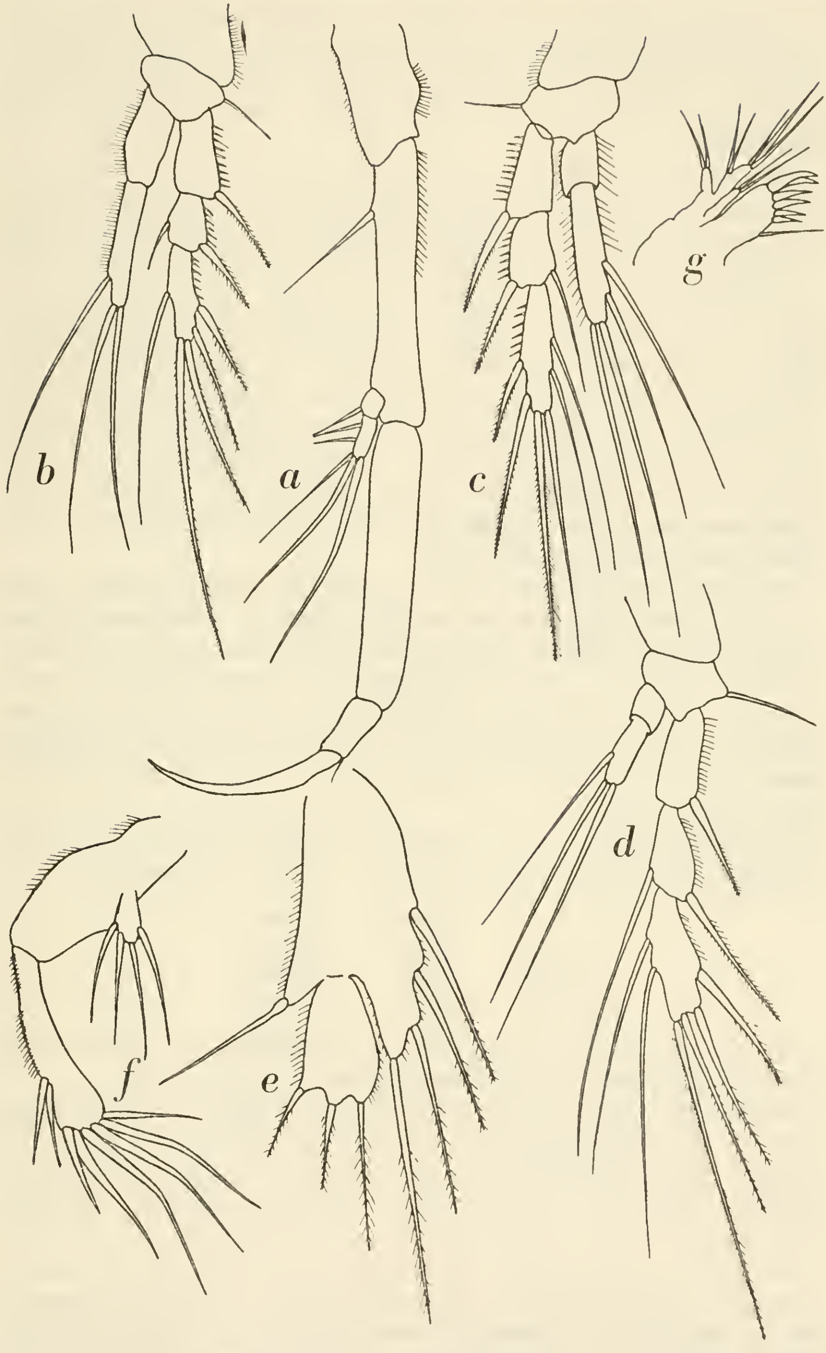

FIGURE 145.—*Onychocamptus gladiator*, new species, loc. 638, ad. ♀, holotype: *a*, leg 1; *b*, leg 2; *c*, leg 3; *d*, leg 4; *e*, leg 5; *f*, antenna; *g*, maxillule. (× 625.)

Antennules slender, about as long as cephalic somite, 6-segmented: segment 2 with outwardly directed, strong hook; external margin of segment 1 strongly haired; segment 4 with conical process, concealing segment 5, bearing aesthetasc and 2 setae. Setation represented in figure 146*a*.

Antenna (fig. 145*f*) with small, unsegmented exopodite, bearing 4 strong setae. Internal margin of allobasis haired, no seta. Endopodite slender, with 2 spines and 6 marginal setae, 3 of which are hooked.

No good preparations of the mandible and the maxilla were obtained.

Maxillule (fig. 145*g*) with elongated arthrite, bearing 6 spiniform setae and fine basal seta. There is one endite, presumably the basal, bearing 2 fine setae. Basipodite elongate, with 3 setae. Endopodite reduced, with 2 setae. Exopodite styliform, small, with 2 fine setae.

Maxillipede (fig. 146*b*) strongly developed, especially endopodite. Coxa lengthened, with single seta. Basis moderately swollen, with convex external margin and haired swelling at internal margin. Endopodite represented by strongly developed, hooked digit of very characteristic shape (cf. fig. 146*b*).

Leg 1 (fig. 145*a*) slender and long; coxa with haired external margin and haired swelling at internal margin. Basis very long and slender, with fine external seta at ⅕ length from apex; internal margin haired. Exopodite extremely short, 2-segmented, segment 2 twice as long as segment 1, with total of 5 appendages. 1st endopodal segment styliform, 6 times as long as wide. 2nd and 3rd endopodal segments fused to form curved, slender digit; place of fusion marked by a fine seta.

The details of legs 2 to 4 appear in figures 145*b–d*; exopodites 3-segmented, endopodites 2-segmented. The setal formula is:

	endopodite	*exopodite*
leg 2	0.120	0.1.122
leg 3	0.220	0.1.222
leg 4	0.120	0.1.222

Leg 2 (fig. 145*b*). Endopodite and exopodite of nearly equal length; internal seta on 2nd exopodal segment very small.

Leg 3 (fig. 145*c*). Endopodite reaches middle of 3rd exopodal segment. Internal seta at 2nd exopodal segment fine and long.

Leg 4 (fig. 145*d*). Endopodite small, as long as 1st exopodal segment. Internal seta of 2nd exopodal segment normally developed.

Leg 5 (fig. 145*e*) with well-developed baso-endopodite, reaching ⅔ length of exopodite, with 4 marginal setae. Exopodite more or less triangular, with 3 marginal setae; internal and external margins haired. External lobe well developed, with strong seta.

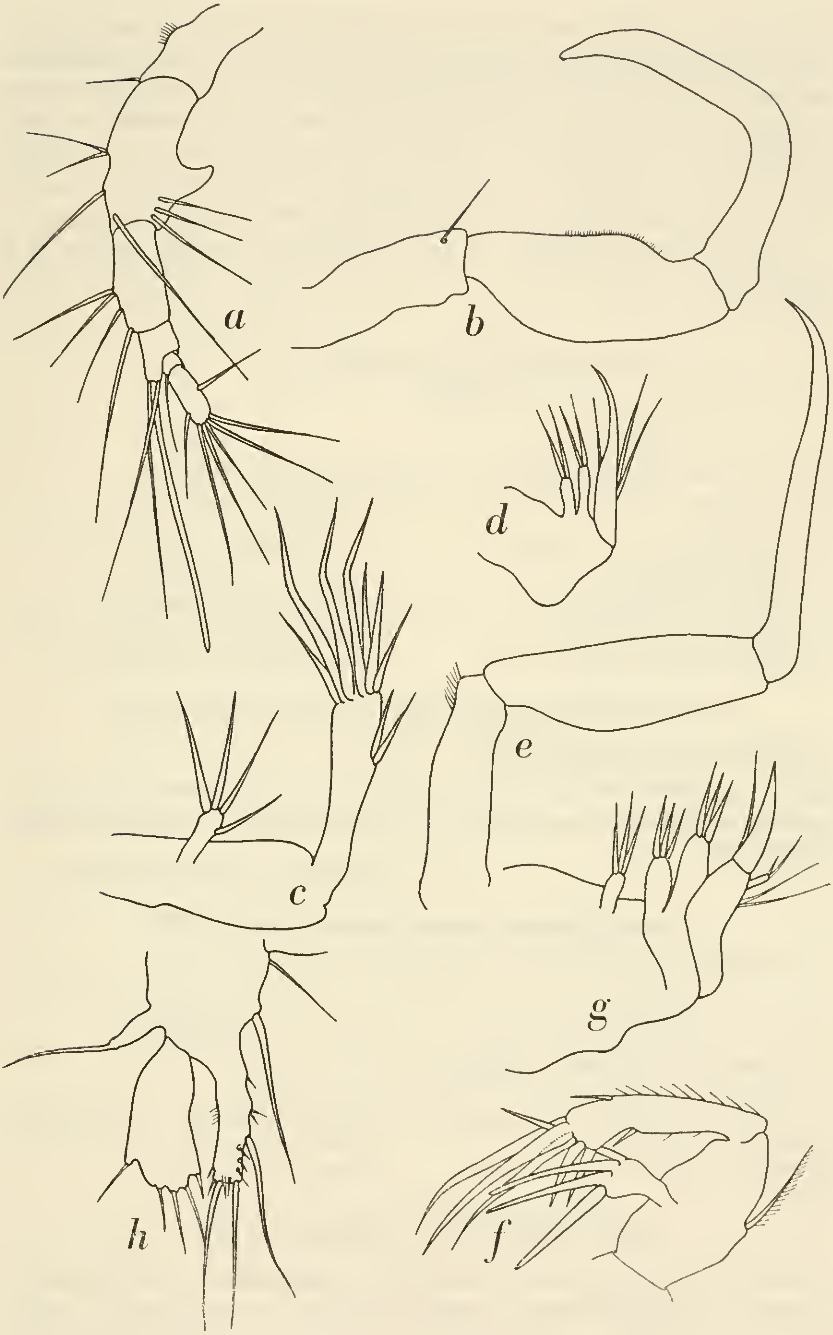

Figure 146.—*Onychocamptus gladiator*, new species, loc. 638, ad. ♀, holotype: *a*, antennule; *b*, maxillipede. *Onychocamptus armiger* (Gurney), loc. 590, ad. ♀: *c*, antenna; *d*, maxilla; *e*, maxillipede. *Microlaophonte spongicola*, new species, loc. 594, ad. ♀, holotype: *f*, antenna; *g*, maxilla; ad. ♀, paratype: *h*, leg 5. (*a–f*, *h*, × 625; *g*, × 1000.)

Remarks.—This new species resembles *O. brevispinosus* (G. O. Sars) in the general shape of the body, although on closer examination there appear to be quite a number of different details. Moreover, the development of the external marginal spines on the exopodite of leg 2 is different; 3 of such spines occur on the 3rd segment in *O. brevispinosus*, 2 in *O. gladiator*. The furcal rami, in *O. brevispinosus*, are 3 times as long as wide and the maxillipedes are normally developed.

A single female specimen of this curious new species occurs in a sample from crevices along the seaward reef margin at Falarik in the Ifaluk Atoll.

Genus *Klieonychocamptus* Noodt, 1958

The following species are known:

Females	Males
Laophonte kliei Monard, 1935a	*L. kliei* Monard, 1935a
Klieonychocamptus kliei confluens Noodt, 1958	*K. k. confluens* Noodt, 1958
Onychocamptus kliei f. *adriatica* Petkovski, 1954	*O. k.* f. *adriatica* Petkovski, 1954
K. discipes Noodt, 1958	*K. discipes* Noodt, 1958
K. diarticulatus Noodt, 1958	*K. diarticulatus* Noodt, 1958
O. ponticus Serban and Plesa, 1957	*O. ponticus* Serban and Plesa, 1957

Genus *Laophontina* Norman and T. Scott, 1905

Only two species are known:

Females	Males
Laophontina dubia Norman and T. Scott, 1905	*L. dubia* Norman and T. Scott, 1905
	Laophontina acantha Noodt, 1955b

Genus *Klieonychocamptoides* Noodt, 1958

The species now recognized in this genus are:

Females	Males
Laophontina brevipes Chappuis 1954	*L. brevipes* Chappuis, 1954
L. renaudi Chappuis and Delamare Deboutteville, 1956	
L. arenicola Chappuis and Delamare Deboutteville, 1956	*L. arenicola* Chappuis and Delamare Deboutteville, 1956
Klieonychocamptoides remanei Noodt, 1958	*K. remanei* Noodt, 1958

Genus *Afrolaophonte* Chappuis, 1960

This monotypic genus was founded by Chappuis on a sand-dwelling Laophontid, *Afrolaophonte monodi* Chappuis, 1960, of which both female and male were described. It approaches *Laophontina* in the reduction of the legs. It was recorded originally from Dakar in French West Africa and quite recently rediscovered near Accra in Ghana (Chappuis and Rouch, 1961, p. 610).

Genus *Harrietella* T. Scott, 1906

Only one species is known:

Females	Males
Laophonte simulans T. Scott, 1894	*L. simulans* T. Scott, 1894
(=*L. brevifurca* Stephensen, 1936)	

Genus *Hemilaophonte* Jakubisiak, 1932

Only one species is known:

Females	Males
Hemilaophonte Janinae Jakubiasiak, 1932	*H. Janinae* Jakubiasiak, 1932

Genus *Lobitella* Monard, 1934

The only species known, *Lobitella apoda* Monard, 1934, has been described on the basis of female specimens, the males being unknown.

Genus *Sarsocletodes* C. B. Wilson, 1924

Two species are known:

Females	Males
Pseudocletodes typicus G. O. Sars 1920	*P. typicus* G. O. Sars, 1920
(=*Pseudoplatychelipus typicus* (G. O. Sars, 1920))	
Sarsocletodes secundus Smirnov, 1946	*S. secundus* Smirnov, 1946

Genus *Mictyricola* Nicholls, 1957

The species recognized are:

Females	Males
Mictyricola typica Nicholls, 1957	*M. typica* Nicholls, 1957
M. proxima Nicholls, 1957	

Laophontinae of Uncertain Position

The following species of Laophontinae are of uncertain position:

FEMALES	MALES
Cleta parvula Claus, 1866	
C. similis Claus, 1866	
Laophonte nordlandica Boeck, 1872	
L. australasica Thomson, 1882	
L. missisippiensis Herrick, 1887	
L. faroënsis T. Scott, 1902	*L. faroënsis* T. Scott, 1902
L. varians Brady, 1910	*L. varians* Brady, 1910
L. glacialis Brady, 1910	
L. wiltoni T. Scott, 1912	*L. wiltoni* T. Scott, 1912
L. trilobita Willey, 1929	*L. trilobita* Willey, 1929
L. royi Jakubiasiak, 1932	
L. litophila Monard, 1934	
	L. borceai Jakubisiak, 1938
L. macani Sewell, 1940 (probably in *Onychocamptus*)	
L. trispinosa Sewell, 1940	
	L. longiseta Nicholls, 1941
L. laurentica Nicholls, 1941b	*L. laurentica* Nicholls, 1941b
	L. arenicola Nicholls, 1941b
L. lamellipes Nicholls, 1944a	*L. lamellipes* Nicholls, 1944a

The species described by Oliveira (1945, p. 198) as *Laophonte sagenarium* is no Laophontid; its description is so inadequate that it cannot be recognized.

Genus *Microlaophonte*, new genus

DIAGNOSIS.—Females: Laophontinae with 6-segmented antennules and elongated, slender body, without distinct demarcation between cephalothorax and abdomen. Somites of body distinctly separated by proximal, ring-shaped constrictions, with exception of 1st and 2nd abdominal somites, which are partly fused. Distal borders of the somites armed with small spinules. Antennules 6-segmented; segment 2 with outwardly directed spur. Antenna with unsegmented exopodite, bearing 4 notably strong setae. Mandibular palp unsegmented, with 4 setae, no exopodite or endopodite. Structure of maxillule unknown. Maxilla with 1 praecoxal, 2 coxal, and 1 basal endite. Leg 1 with 2-segmented exopodite; 2nd exopodal segment with 5 appendages. Legs 2 to 4 with 3-segmented exopodite and 2-segmented endopodites. The setal formula is:

	endopodite	*exopodite*
leg 2	0.210 or 111	0.1.212
leg 3	0.310 or 220	0.1.222 or 312
leg 4	0.221	0.1.222

3rd exopodal segment of legs 2 to 4 short, external marginal spines slender, all appendages inserting close together. 2nd endopodal segment of legs 2 and 3 with apically inserting setae. Leg 5 with long and slender baso-endopodite, bearing 4 setae. Exopodite elongated triangular, with 5 short, marginal setae.

Males unknown.

Type and sole species: *Microlaophonte spongicola*, new species.

Microlaophonte spongicola, new species

Figures 141*a*,*b*, 146*f*–*h*, 147

Material.—Loc. 594, 4 ad. ♀♀, 0.38–0.48 mm. (0.43 mm.).

Description.—An adult female of 0.46 mm. has been selected as the holotype; the following is based largely upon this specimen. Some information also has been gained from the remaining (paratype) specimens, all of which have been dissected.

Adult female, total length 0.46 mm.; greatest diameter 0.11 mm.; length of longest furcal seta 0.18 mm.

Body very slender, greatest diameter at end of cephalic somite, anteriorly rounded, posteriorly very gradually narrowing, without any trace of division in cephalothorax and abdomen. Body, moreover, cylindrical, not depressed (figs. 141*a*,*b*). Cephalic somite formed by complete fusion of head and 1st thoracic somite, short, as long as combined lengths of thoracic somites 2 to 4. Sides of cephalic somite produced to cover the oral appendages. Back, in lateral view, slightly curved, running imperceptibly into short rostrum (fig. 141*b*). Rostrum in dorsal aspect short, compact plate with broad base, free margin sinuous, with two hairs of frontal organ. Thoracic somites 2 to 5 of equal length; epimeral plates moderately produced, rounded. Some knobs occur along dorsal part of distal border of somites 4 and 5.

Genital somite composed of fused abdominal somites 1 and 2, which have equal length; line of fusion distinct on dorsal surface. 3rd abdominal somite longer than preceding; 4th somite short. Abdominal somites 2 to 4 distally with fine spinules or knobs along dorsal and laterodorsal margin. Anal somite as long as wide; anal plate broadly rounded, spinulose; somite deeply cleft between insertion of caudal rami.

Caudal rami cylindrical, 3½ times as long as wide, internal margin very slightly concave. 5 marginal setae and 1 appendicular seta, inserting very closely together at caudal end of each ramus. All are short with exception of seta 2, which, on each side, is greatly lengthened and thickened.

Ventral aspect of genital area represented in figure 147*i*, from which it appears that epimeral plates of abdominal somites 1 to 3 are slightly lateroventrally produced and pointed.

Antennules short, 6-segmented: segment 2 with outwardly turned spur; segment 4 with conical process, bearing aesthetasc and seta. Setation represented in figure 147*g*.

Antenna (fig. 146*f*) with short, ovate allobasis, bearing setose internal seta. Exopodite unsegmented, with 4 notably strong setae, one of which is dagger-shaped. External border of endopodite strongly spinulose. 5 appendages on endopodite: 2 short spines and 3 geniculate setae. In addition, there is an appendicular seta.

Mandible with well-shaped cutting edge at praecoxa, bearing number of teeth (I could not make exact count) and large basal seta. Palp indistinctly segmented, with 4 big setae; no exopodite or endopodite.

Maxillule in unfavorable position in dissection with the result that I cannot describe its structure.

Maxilla (fig. 146*g*) small, praecoxa with one small endite, bearing 3 setae. Coxa small, with 2 endites, each with 3 setae. Basal endite slightly larger, with strong, coalescent spine and fine seta. Endopodite small, styliform, 2-segmented, with 2 setae on each segment.

Maxillipede (fig. 147*h*) of usual shape, chelate. Coxa apically with 2 setae; basis slightly swollen, nude. Endopodite composed of 2 indistinctly separate segments; basal segment small, apical segment forming slender, acutely pointed dactylus, longer than basis.

Leg 1 (figs. 147*a*,*b*) slender, coxa and basis moderately long. Basis with external seta, haired frontal tubercle and seta on socle carrying endopodite. Exopodite 2-segmented; segments of equal length, 2nd with 5 appendages. 1st endopodal segment styliform, 3 times length of exopodite, 6 times as long as wide; internal margin haired. 2nd and 3rd endopodal segments fused, with fine seta near line of fusion: they form a slender, pointed, slightly curved digit.

Legs 2 to 4 with 3-segmented exopodites and 2-segmented endopodites. The particulars are in figures 147*c*–*e* and the setal formula:

	endopodite	*exopodite*
leg 2	0.210 or 111	0.1.212
leg 3	0.310 or 220	0.1.222 or 312
leg 4	0.221	0.1.222

Spines along external margin of exopodites slender, almost setiform; appendages of 3rd exopodal and 2nd endopodal segments closely approximated, with the result that the insertion along internal or external margin cannot be ascertained. Endopodites, moreover, haired, with the result that small setae may have been obscured. All 3rd exopodal segments are short.

Leg 2 with long 1st endopodal segment, external margin of which carries either thick hair or short seta (fig. 147*c*).

Leg 4 with distinct, spinulose internal seta on 2nd endopodal segment (fig. 147*e*).

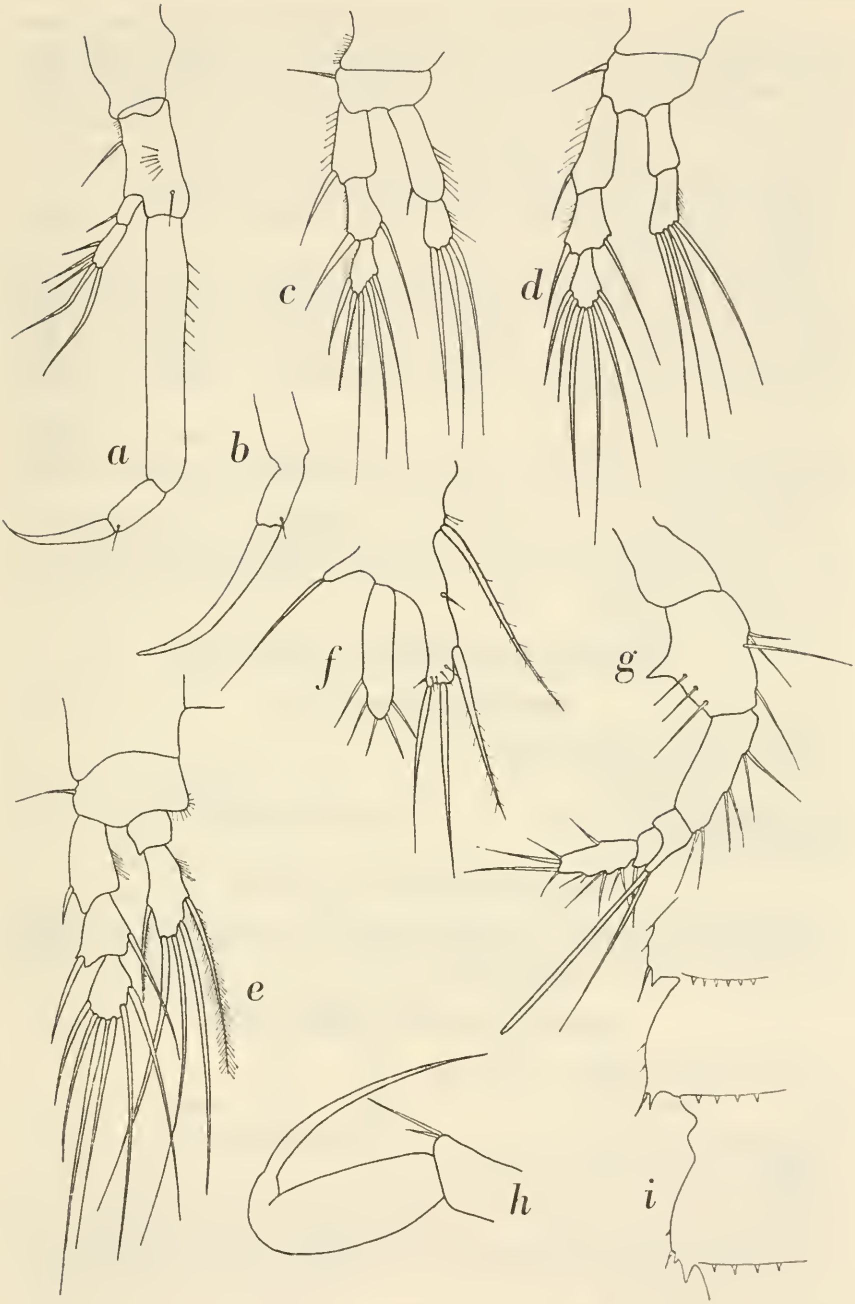

FIGURE 147.—*Microlaophonte spongicola,* new species, loc. 594, ad. ♀, holotype: *a*, leg 1; *b*, apex of endopodite of leg 1; *c*, leg 2; *d*, leg 3; *e*, leg 4; *f*, leg 5; *g*, antennule; *h*, maxillipede; *i*, margins of abdominal somites 1–3, left side, in slightly inverted position. (*a*, *c*–*g*, *i*, × 625; *b*, *h*, × 1000.)

Leg 5 (figs. 146*h*, 147*f*) remarkable by greatly lengthened baso-endopodite, which reaches apex of exopodite. 4 strong setae along baso-endopodite: 2 at apex, 2 along internal border, basal of which is very strong. Probably 5th seta, or long hair, near insertion of intercoxal plate on baso-endopodite. External lobe long, with strong seta. Exopodite elongated triangular or ovate, with 5 short setae.

Color completely faded, transparently whitish. No eye or pigmented spots observed.

Remarks.—Though the species shows certain points of resemblance with *Onychocamptus* and *Klieonychocamptus*, it has such a fundamentally different setal formula that I have been forced to place it in a new genus, the affinities of which, because of the absence of males, is unfortunately obscure.

Four female specimens of this new species were washed from sponges from the lagoon at Ifaluk Atoll; the depth at which they were obtained is not given.

The curious structure of the legs and particularly the setal formula have been checked in all four dissected specimens and have been found to be constant.

Subfamily Normanellinae Lang, 1944

Genus *Cleta* Claus, 1863

The two species known are:

Females	Males
Cleta lamellifera Claus, 1863	*C. lamellifera* Claus, 1863
C. secunda Sewell, 1924	

Genus *Pseudocleta* Lang, 1944

This genus is based on a single species, *Laophonte corbula* Willey, 1935, known only in the female stage.

Genus *Normanella* Brady, 1880

The following species are known:

Females	Males
Mesochra minuta Boeck, 1872	*M. minuta* Boeck, 1872
Normanella dubia Brady and Robertson, 1875	
N. tenuifurca G. O. Sars, 1909	*N. tenuifurca* G. O. Sars, 1909
N. mucronata G. O. Sars, 1909	*N. mucronata* G. O. Sars, 1909
N. mucronata reducta Noodt, 1955	*N. mucronata reducta* Noodt, 1955
N. incerta Lang, 1934	
N. semitica Monard, 1935	
N. quarta Monard, 1935a	
N. similis Lang, 1936	*N. similis* Lang, 1936

Genus *Cletopsyllus* Willey, 1935

This genus is based on *Cletopsyllus papillifer* Willey, 1935, the only species known, of which only the female has been described.

Genus *Pseudocletopsyllus,* new genus

Type and sole species: *Pseudocletopsyllus spiniger,* new species.

Diagnosis.—Females: Normanellinae with heavily armed body. Head and 1st thoracic somite fused, epimeral plates of all somites, with exception of abdominal somite 4 and anal somite, laterally produced, backwardly drawn out and pointed. In addition, there are lateral expansions on some of the somites, while cephalic and body somites are distally armed with big spines, the 4th and anal somites excluded.

Rostrum big, not separated from cephalic somite, bifid at apex. Furcal rami long, tubular, with 2 setae at swollen internal margin and 5 marginal setae, 2 of which are lengthened and thickened. Antennules 4-segmented: segment 1 with external spine; segment 2 with 2 externally directed apophyses, each bearing seta; segment 3 with conical process bearing aesthetasc and 2 seta. Antenna with allobasis and small exopodite, bearing 2 fine setae. Mandible with unsegmented basipodite, small endopodite, and no exopodite. Structure of maxillule unknown. Maxilla with 2 praecoxal, 1 coxal, and 1 basal endite; basal and coxal endites each with 2 spines and a seta, endopodite reduced. Maxillipede with moderately swollen basis; endopodite unsegmented, forming slender digit. Leg 1 with 3-segmented exopodite, segment 2 without internal seta. 1st segment of endopodite with internal seta; 2nd and 3rd segments fused, with strong seta at place of insertion. Legs 2 to 4 with 3-segmented exopodites and 2-segmented endopodites. The setal formula is given in the following table, in which, for the purpose of comparison, the setal formula of *Cletopsyllus papillifer* Willey, 1935, also is given.

specimen	*leg 2*		*leg 3*		*leg 4*	
	endopodite	exopodite	endopodite	exopodite	endopodite	exopodite
P. spiniger	1.421	0.1.123	1.321	1.1.223	1.321	1.1.223
C. papillifer	1.421	0.1.123	1.321	1.1.223	1.321	1.1.323

Leg 5 with baso-endopodites of both sides connected by median plates; jointing between exopodite and baso-endopodite indistinct. External lobe greatly lengthened, with fine seta. Exopodite elongate, with 6 setae. Baso-endopodite slightly shorter than exopodite, with 2 apical and 3 internal spines.

The males are unknown.

Remarks.—Unfortunately, I have to base the description of this new genus on a single female specimen. The dissection of this specimen proved to be completely successful and shows several points of difference with *Cletopsyllus* Willey, 1935, with which it is undoubtedly closely related.

The body, in *P. spiniger*, is heavily armed with spines; in *C. papillifer* there are no such spines.

Leg 1, in *P. spiniger*, has no internal seta on the 2nd exopodal segment; such a seta is present in *C. papillifer*.

Leg 3 has the same setal formula in both species, but in Willey's drawing of this appendage (Willey, 1935, fig. 81), he figures 3 internal setae at the 3rd exopodal segment (only 2 according to the setal formula).

Leg 4, in *P. spiniger*, has 2 internal setae on the 3rd exopodal segment, bringing the total number of appendages on this segment up to 7; 3 are present in *C. papillifer*, with a total of 8.

There are many differences in shape and setation of leg 5, as a comparison on the drawings of both appendages will show. Noteworthy is the long baso-endopodite in *P. spiniger* and its fusion with the exopodite.

The combination of characters mentioned above prompted me to place the specimen to be described below in a new genus, the more so since the setation of the legs is of fundamental importance in the characterization and the limitation of genera in the Laophontidae. In this connection special importance must be attached to the absence of an internal seta on the 2nd exopodal segment of leg 1 although it must be admitted that the corresponding seta in *Cletopsyllus* is very small and fine.

***Pseudocletopsyllus spiniger*, new species**

FIGURES 148, 149

MATERIAL.—Loc. 594, 1 ad. ♀, 0.66 mm.

DESCRIPTION.—The following is based on the above-mentioned holotype specimen; it has been dissected and mounted.

Adult female, total length 0.66 mm.; greatest diameter 0.18 mm.; furcal setae broken.

Body strongly built, of very characteristic appearance, slightly depressed dorsoventrally, greatest diameter at 3rd thoracic somite and very gradually narrowing posteriorly (fig.148*b*). Head and 1st thoracic somite fused; cephalic somite occupies, with rostrum, ⅓ length of body. Cephalic somite dilated in oral region, extreme posterolateral corner laterally produced and pointed. Distinct groove runs backward from insertion of antennules. Rostrum big and heavy, inserting with broad base, reaching halfway along 2nd antennular segment, slightly curved downward. Apex rounded, minutely bifid at tip, with two fine hairs. Thoracic somites 2 to 5 of

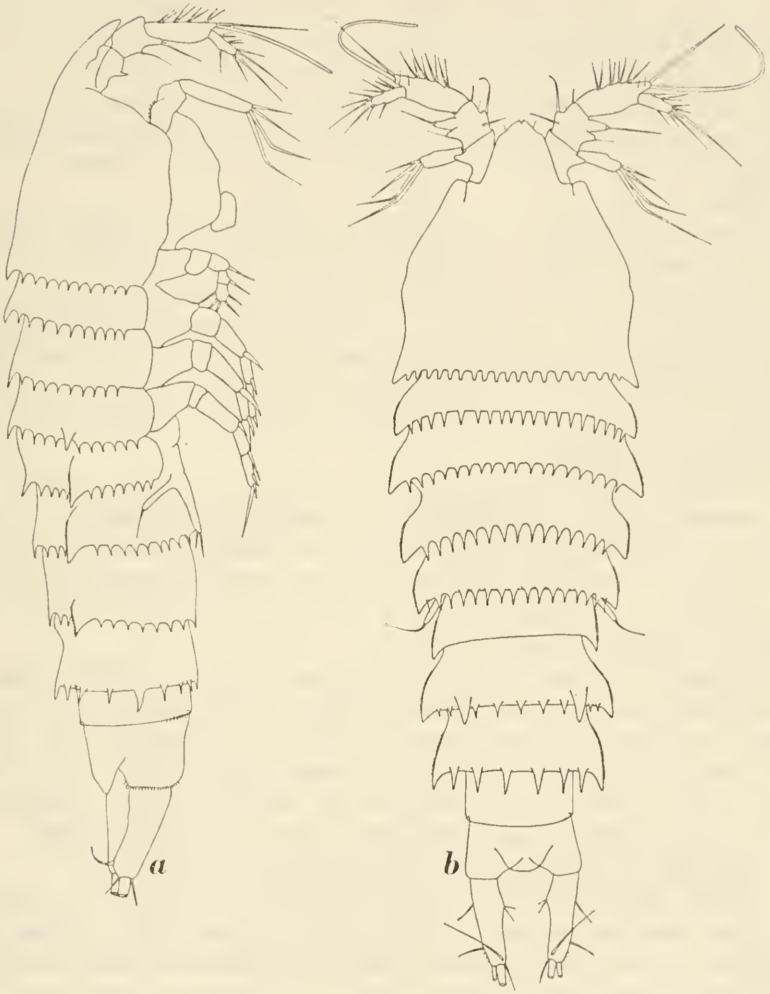

FIGURE 148.—*Pseudocletopsyllus spiniger*, new species, loc. 594, ad. ♀, holotype: *a*, whole animal, lateral view from right side; *b*, same animal, dorsal view. (× 165.)

equal length, epimeral plates laterally expanded, extreme tip produced backward and pointed. Epimeral plates at margin finely denticulated. Cephalic somite and somites 2 to 5 at dorsal part of distal margin with very coarse teeth. 5th thoracic somite with short lateral expansion, superior to epimeral expansion.

Genital somite composed of fused abdominal somites 1 and 2, line of fusion distinct on dorsal surface. Epimeral plate of 1st, slightly, of 2nd abdominal somite, considerably, laterally expanded. In addition, there are backwardly produced lateral expansions, superior to the epimeral plates. Segment 3 with laterally produced epimeral plates but without additional expansions. Abdominal somites 1 to 3 completely encircled distally by coarse spines. Segment 4 short, but in this specimen considerably telescoped into 3rd. There are some lateroventral spinules, but no distal teeth. Anal somite as long as 4th, half as long as wide, with big and heavy anal plate with smooth, broadly rounded border. Insertion of furcal rami bordered with spinules.

Furcal rami tubular, 3 times as long as wide, external wall straight, internal wall with slight swelling at ⅓ length from base; 2 fine setae insert on swelling. 5 marginal setae and 1 appendicular seta on each ramus; setae 1, 4, 5, and appendicular seta fine, setae 2 and 3 lengthened and thickened but both damaged in my specimen, with the result that accurate structure cannot be given. In lateral aspect furcal rami distinctly carinated in longitudinal direction; appendicular seta found at end of carina.

Antennules (fig. 149*f*) short, half length of cephalic somite, 4-segmented: segment 1 with distinct outwardly directed spine; segment 2 with 2 outwardly directed tubercles, each bearing fine seta; segment 3 long, apparently resulting from fusion of several segments, with big conical process, bearing aesthetasc and seta; ultimate segment short. Setation represented in figure 149*f*.

Allobasis of antenna with 2 internal swellings, each with spinules, and small exopodite with 2 minute setae. Endopodite with 2 spines and 5 marginal, spiniform setae, 3 of which are geniculate (fig. 149*g*).

Mandibular praecoxa with small cutting edge, bearing 5 teeth and small seta. Basipodite unsegmented, with 3 setae. Exopodite absent, endopodite unsegmented, with 3 setae, short (fig. 149*h*).

Dissection of maxillule, unfortunately, unsuccessful.

Maxilla (fig. 149*i*) with 4 endites: 2 found on praecoxa, each bearing 3 setae; coxal endite much bigger, with 2 strong curved spines and additional seta; basal endite as coxal endite, one of the spines of which is larger. There are 2 basal setae which apparently represent the endopodite.

Maxillipede (fig. 149*j*) with short coxa and slightly swollen basis. Endopodite unsegmented, forming curved, pointed digit, distally corrugated.

Leg 1 (fig. 149*a*) with 3-segmented exopodites and endopodites; basis curiously developed by presence of huge socle for endopodite. Seta at external border and spine on socle near insertion of endopodite. Exopodal segments of equal length, 2nd without internal seta, 3rd with 4 appendages, 2 of which are geniculate setae. 1st endopodal segment 1½ times as long as exopodite, 5 times as long as wide, with seta at half internal margin. 3rd and 2nd endopodal segments coalescent, forming very slender digit; distinct big seta near fusion of both segments, reaching length of 3rd segment.

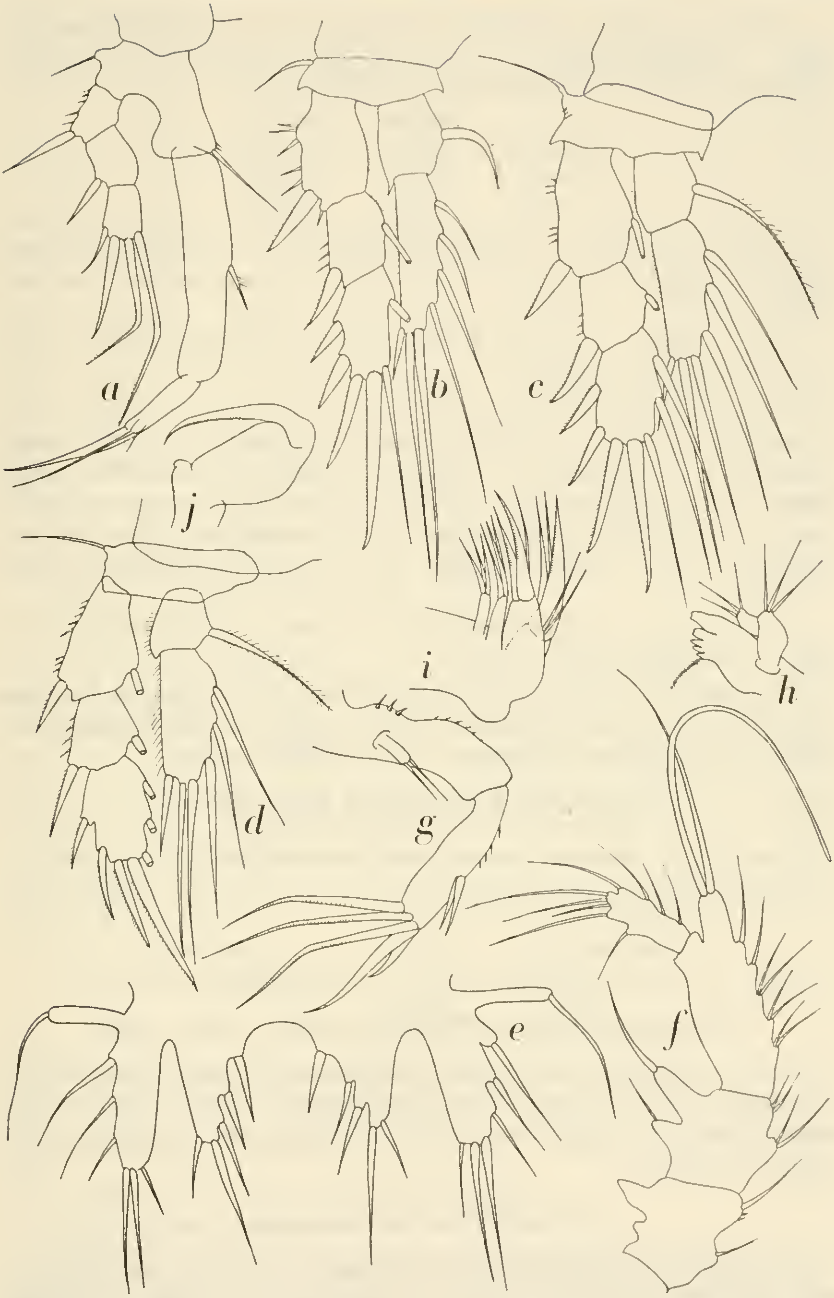

Figure 149.—*Pseudocletopsyllus spiniger*, new species, loc. 594, ad. ♀, holotype: *a*, leg 1; *b*, leg 2; *c*, leg 3; *d*, leg 4; *e*, 5th legs; *f*, antennule; *g*, antenna; *h*, mandible; *i*, maxilla; *j*, maxillipede. (× 460.)

Legs 2 to 4 with 3-segmented exopodites and 2-segmented endopodites. The particulars of these legs appear in figures 149*b–d*, the setal formula, and the following notes. Setal formula:

	endopodite	*exopodite*
leg 2	1.421	0.1.123
leg 3	1.321	1.1.223
leg 4	1.321	1.1.223

Leg 2. No seta at internal margin of 1st exopodal segment; external margin of 1st endopodal segment drawn out in point (fig. 149*b*).

Legs 3 and 4. Internal margin of 1st exopodal segment with distinct seta (figs. 149*c,d*).

Leg 5 (fig. 149*e*) with baso-endopodites of both sides fused in middorsal line to distinct intercoxal plate on ventral aspect of thoracic somite 5. Baso-endopodite slightly shorter than exopodite, with 5 spines: 2 at apex, 3 at internal border. Jointing between exopodite and baso-endopodite indistinct; exopodite elongate, with 6 setae: 1 internal, 2 apical, and 3 external. External lobe greatly lengthened, with fine seta.

Color yellowish, without indication of presence of eyes or pigmented spots. Female carries no eggs.

REMARKS.—The reasons for the inclusion of this species in a new genus have been stated above (p. 378). A single female specimen was obtained in washings of sponges from the Ifaluk lagoon.

Subfamily Donsiellinae Lang, 1944

Genus *Donsiella* Stephensen, 1936

The sole species of this genus is:

FEMALES	MALES
Donsiella limnoriae Stephensen, 1936.	*D. limnoriae* Stephensen, 1936.

Genus *Laophontella* Thompson and A. Scott, 1903

The only species of this genus, *Laophontella typica* Thompson and A. Scott, 1903, is known very insufficiently; the male also is still undescribed. Its proper place in the Laophontidae cannot be ascertained accurately.

Genus *Pholenota*, new genus

DIAGNOSIS.—Females: Body cylindrical and slender, cephalothorax and abdomen distinctly separate, of nearly equal length. Head and 1st thoracic somite fused. Rostrum short, quadrangular plate, hollowed centrally, separated from head by distinct groove. Epimeral plates of thoracic somites 2 to 4 normally developed, rounded. Genital complex composed of fused somites 1 and 2, with slight lateral swellings. Furcal rami about as long as wide, with dorsocaudally inserting setae, caudoventral part of each ramus backwardly produced, pointed. Setae 2 and 3 short, curved, basally swollen. Antennules 8-segmented; segment 4 long, with small conical process. Antenna with allobasis and long, unsegmented exopodite, bearing 4 setae. Some of endopodal spines spatulate. Mandible with well-developed cutting edge; palp slender, with 3 setae, endopodite and exopodite present, both unsegmented, with 6 and 2 setae respectively. Arthrite of maxillule with some lanceolate and some normal setae. Coxal and basal endite present, some of setae spatulate. Basipodite much reduced, fused with endopodite, bearing 4 setae. Exopodite small, with 3 setae. No epipodite. Maxilla with 4 endites (2 praecoxal, 1 coxal, 1 basal), basal endite with strong, coalescent spine. Endopodite reduced, with 4 setae, one of which is strong. Maxillipede chelate, basis moderately swollen; endopodite forming slender digit.

Leg 1 of type met with in Laophontidae, strongly developed. Coxa and basis large, basis with external spinulose seta and small internal spine. Exopodite 3-segmented, segment 2 without internal seta, segment 3 with 5 appendages. Endopodal segment 1 styliform, with short internal subapical seta. 2nd endopodal segment swollen, fused with big, claw-shaped 3rd segment; strong seta occurs near line of fusion. Endopodite thus becomes powerfully developed clasping organ. Legs 2 to 4 with 3-segmented exopodites and endopodites. External marginal spines of exopodite lanceolate. The setal formula is:

	endopodite	*exopodite*
leg 2	1.1.121	0.1.223
leg 3	1.2.221	0.1.223
leg 4	1.1.221	0.1.323

Some of setae of endopodite and exopodite spatulate.

Leg 5 with ovate exopodite, bearing 6 setae. Baso-endopodite short, with 5 setae. External lobe normally developed, with fine seta.

Females carry single, heavily encased egg.

Males unknown.

Type and sole species: *Pholenota spatulifera*, new species.

Remarks.—I am completely puzzled by the curious combination of characters which the type of this new genus, *P. spatulifera*, presents. The structure of leg 1 is exactly as found in the Laophontidae, particularly in the Normanellinae. There is, nevertheless, no species of Laophontidae with 3-segmented endopodites of legs 2 to 4. The structure of antennules, antenna, mouth parts, and legs 2 to 5 suggests in many details the Diosaccidae; indeed, I would have been inclined to include this species in the Diosaccidae except for the very different structure of leg 1. Furthermore, this species is remarkable by the presence of lanceolate spines on the maxillular arthrite and on the exopodites of legs 2 to 4, and by the presence of several spatulate setae. The rostrum does not conform to either Laophontidae or Diosaccidae.

The curious combination of characters and particularly the absence of the male has forced me to introduce a new genus for the reception of this species, the description of which, unfortunately, must remain incomplete until the discovery of the male. This new genus, *Pholenota*, combines characters of Laophontidae and Diosaccidae and only very provisionally has been placed here at the end of the Laophontidae. The generic name proposed, *Pholenota*, is an anagram of *Laophonte*. The trivial name for its type species, *spatulifera*, refers to the presence of spatulate setae on the legs.

***Pholenota spatulifera*, new species**

FIGURES 150, 151

MATERIAL.—Loc. 638, 1 ad. ♀, 0.48 mm.

DESCRIPTION.—The following is based on the above-mentioned holotype specimen, which has been dissected and mounted.

Adult female, total length 0.48 mm.; greatest diameter 0.11 mm.; length of longest furcal seta 0.15 mm.

Body slender and cylindrical, with distinct separation between cephalothorax and abdomen. Greatest diameter at end of cephalic somite, anteriorly rounded, posteriorly narrowing gradually, slightly dilated in genital region. Head and 1st thoracic somite completely fused; cephalic somite as long as combined lengths of thoracic somites 2 to 4. Cephalic somite in lateral aspect with smoothly rounded back, curving into small rostrum (fig. 150*a*). Sides slightly produced and rounded. Rostrum small, more or less rectangular plate with rounded corners, hollowed centrally and separated from head by distinct groove pointing forward and slightly downward, as long as 1st antennular segment. Some chitinized ridges at end of cephalic somite that create impression of distal teeth (fig. 150*b*). Thoracic somites 2 to 4 of equal length, epimeral plates slightly produced, rounded.

5th thoracic somite distinctly visible laterally and dorsally, slightly broader than preceding somite. Genital somite resulting from fusion between abdominal somites 1 and 2, as long as combined lengths of abdominal somites 3 and 4. Line of fusion very distinct

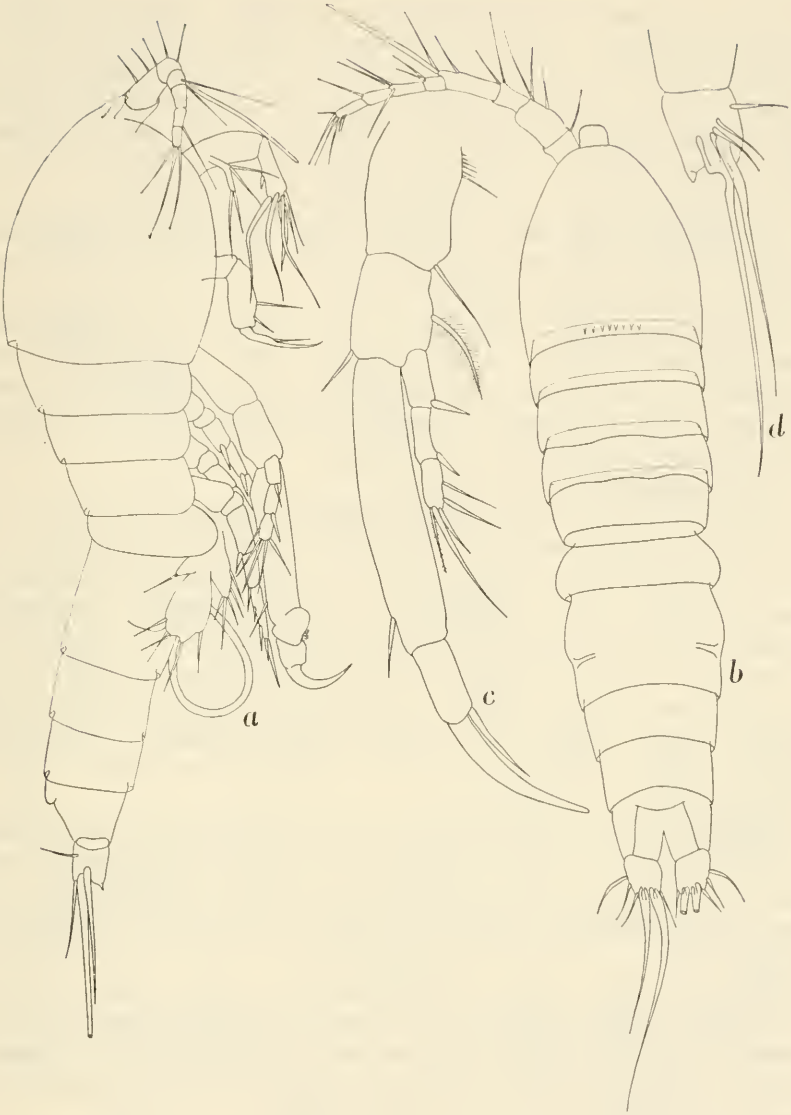

Figure 150.—*Pholenota spatulifera*, new species, loc. 638, ad. ♀, holotype: *a*, whole animal, lateral view from right side; *b*, same animal, dorsal view; *c*, leg 1; *d*, left furcal ramus, lateral view from left side. (*a*, *b*, × 210; *c*, *d*, × 340.)

dorsally and laterally; in dorsal aspect, anterior part of genital complex slightly swollen laterally and constricted behind that swollen part; in lateral aspect, small flap to accentuate place of fusion. Abdominal somites 3 and 4 of equal length. Anal somite as long as broad, slightly tapering posteriorly. Anal flap distinct, placed proximally, broadly rounded, nude. Furcal rami parallel, tapering, greatest diameter at base, narrowing distally. Insertion of setae on dorsocaudal part of each ramus, with the result that small part of furcal ramus is free, which part is slightly backwardly produced and carries a small spinule. Each ramus has 5 marginal setae and 1 appendicular seta. Setae 2 and 3 are longer than remaining setae, and are curved and swollen at base. Furcal structure appears best in figure 150*d*. No hairs or spinules along distal margins of any of somites.

Antennules longer than cephalic somite, 8-segmented. Segment 4 long, with distinct conical process bearing aesthetasc and 2 setae. Setation represented in figure 151*e*.

Antenna (fig. 151*f*) with allobasis and internal seta. Exopodite long, segmentation not visible, with 4 strong marginal setae and indication of small spine near apical seta. Endopodite short, with 7 marginal and 2 appendicular setae. Of marginal setae, 1 curved, 2 geniculate, 1 geniculate and spatulate, and 3 spatulate. Internal margin of endopodite spinulose.

Mandible (fig. 151*g*) with big praecoxal cutting edge, bearing 6 acute teeth and basal seta. Palp well developed, composed of large basipodite with 3 setae, one of which spinulose. Endopodite well developed, with 6 setae, one of which spinulose. Exopodite small, styliform, with 2 strongly spinulose setae. No epipodite.

Maxillule (fig. 151*h*) with short arthrite, bearing 4 spatulate and 3 normal setae. Coxal endite small, with 3 setae. Basal endite slightly longer, with 4 setae, one of which spatulate. Endopodite small, unsegmented, with 4 setae. Exopodite also small, with 3 strong, spinulose setae.

Maxilla (fig. 151*i*) with total of 4 endites: 2 small praecoxal endites, each with 2 setae; coxal endite also small, with 2 setae; basal endite well developed, coalescent with big spine, bearing additional seta. Endopodite distinct, unsegmented, with 4 setae, one of which fairly strong.

Maxillipede (fig. 151*j*) chelate, coxa short, without setae. Basis moderately swollen, internal and external margins slightly convex. Internal margin strongly spinulose and, in addition, with 3 setae. Endopodite composed of 2 fused segments, forming curved digit, bearing 2 additional setae near line of fusion.

Leg 1 (fig. 150*c*) very strongly developed, especially endopodite. Coxa big, with some spinules and seta at external margin. Basis with strong, spinulose, external seta and fine seta on socle supporting endopodite. Exopodite 3-segmented, segments of equal length, 2nd without internal seta; 3rd with total of 5 appendages, one of which is haired seta. 1st endopodal segment twice as long as exopodite, 5 times as long as wide, with subapical seta at internal margin. 2nd endopodal segment strongly swollen, coalescent with apical

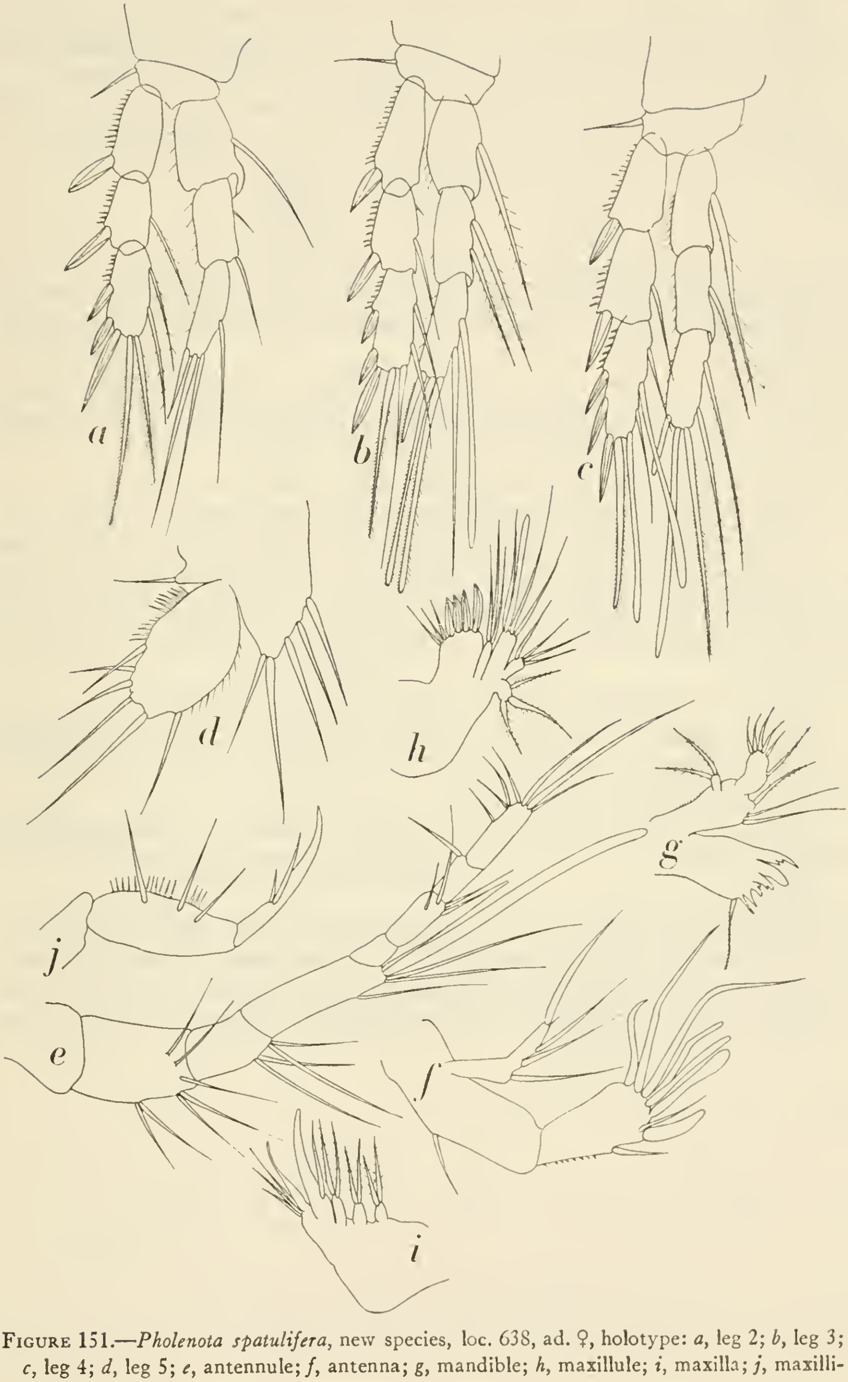

FIGURE 151.—*Pholenota spatulifera*, new species, loc. 638, ad. ♀, holotype: *a*, leg 2; *b*, leg 3; *c*, leg 4; *d*, leg 5; *e*, antennule; *f*, antenna; *g*, mandible; *h*, maxillule; *i*, maxilla; *j*, maxillipede. (× 460.)

segment, forming curved, powerful, obtusely pointed claw. Near line of fusion strong seta, ⅔ length of claw, with the result that endopodite appears to have 2 appendages: curved claw and seta.

Leg 2 to 4 with 3-segmented exopodites and endopodites. The details can be taken from figures 151*a*–*c*; the setal formula is:

	endopodite	*exopodite*
leg 2	1.1.121	0.1.223
leg 3	1.2.221	0.1.223
leg 4	1.1.221	0.1.323

All external marginal spines on exopodites lanceolate; external borders of exopodites strongly spinulose; external borders of endopodites haired.

Leg 2 (fig. 151*a*). 2nd endopodal segment, in addition to seta, with strong hair at internal margin, which easily may pass as small seta.

Leg 3 (fig. 151*b*). 3 setae of 3rd endopodal segment spatulate.

Leg 4 (fig. 151*c*). 3 internal setae on 3rd exopodal segment on left side and 2 on right. One may have been removed during preparation but I failed to find the insertion. Median as well as apical seta along that margin spatulate; 1 of setae on 3rd endopodal segment also spatulate. Internal seta of 1st endopodal segment remarkably strong.

Leg 5. Exopodite ovate, twice as long as broad, with 6 setae; external margin spinulose, internal margin haired. Baso-endopodite small and short, ⅓ length of exopodite, with 5 setae, position of which can be judged from figure 151*d*.

Color completely faded, transparently yellowish. Female carries single, heavily encased egg, attached to genital aperture with short pedicel.

REMARKS.—The reasons for the inclusion of this specimen in a new genus have been given on pages 383, 384. Only a single female specimen was obtained from crevices at the seaward reef margin of Falarik in the Ifaluk Atoll. Its curious structure probably points in the direction of a strong specialization.

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